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MOTOR AGE

VOLUME XVII CHICAGO, JANUARY 6, 1910 NUMBER 1

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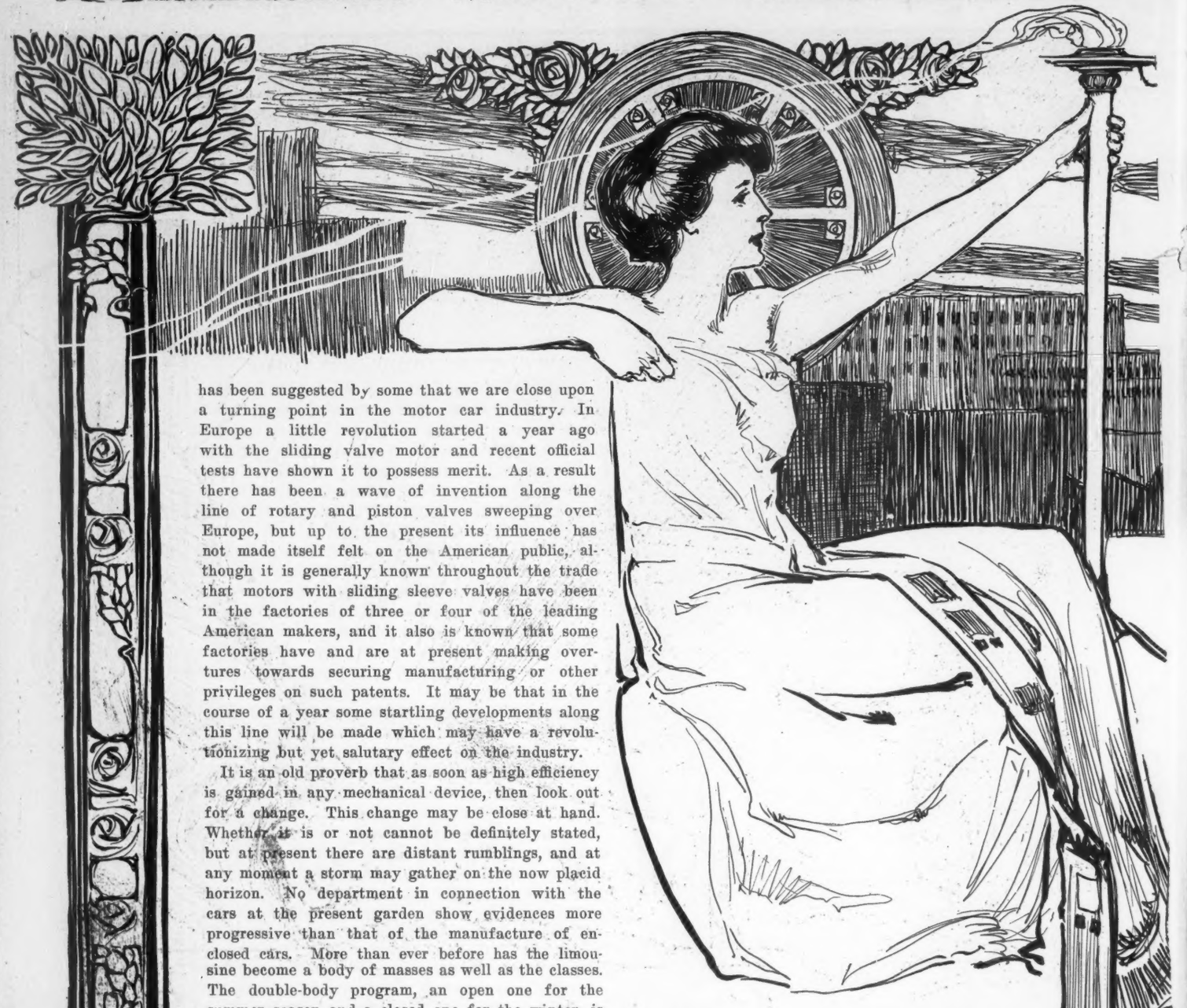
VOL. XVII., NO. 1 CHICAGO, JANUARY 6, 1910 $3.00 PER YEAR

MOTOR AGE

Now It's the Garden Show

NEW YORK, Jan. 3—Once more are the annual first fruits of the A. L. A. M. laid before the critical inspection of the American citizen to pass judgment on whether the changes made for 1910 are for the permanent betterment of the car industry or if they are makeshifts of the present, many of which may be discarded entirely within a year or so. Generally speaking, there have been few big changes in the 1910 products of the licensed builders. When it is pointed out that over 50 per cent of the models on exhibition has not had any change made in the bore or stroke of the motor, it is a pretty good indication that present cars possess a goodly share of merit, at least that measure of satisfaction which is being given by the best cars built in any country today. Americans in a few cases have learned the art and science of car-building and are abreast of the times, but it is not sufficient reason to stop simply because you have caught the other fellow whom you have trailed for years perhaps and have only now caught up with him. In progressing, comparisons are only valuable in that they show how far we may be behind the leader, but once abreast with him we must forge ahead, constantly beckoned on by that light of perfection. It

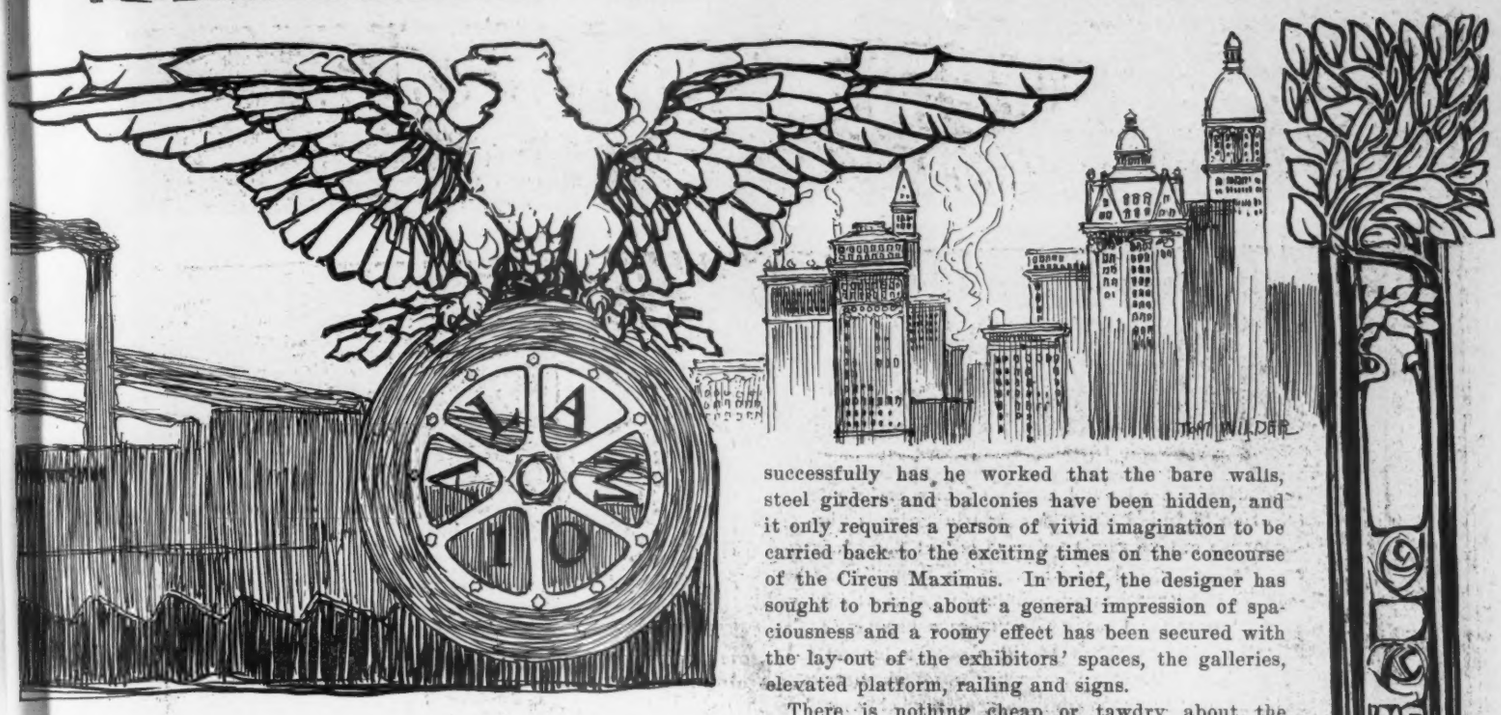


has been suggested by some that we are close upon a turning point in the motor car industry. In Europe a little revolution started a year ago with the sliding valve motor and recent official tests have shown it to possess merit. As a result there has been a wave of invention along the line of rotary and piston valves sweeping over Europe, but up to the present its influence has not made itself felt on the American public, although it is generally known throughout the trade that motors with sliding sleeve valves have been in the factories of three or four of the leading American makers, and it also is known that some factories have and are at present making overtures towards securing manufacturing or other privileges on such patents. It may be that in the course of a year some startling developments along this line will be made which may have a revolutionizing but yet salutary effect on the industry.

It is an old proverb that as soon as high efficiency is gained in any mechanical device, then look out for a change. This change may be close at hand. Whether it is or not cannot be definitely stated, but at present there are distant rumblings, and at any moment a storm may gather on the now placid horizon. No department in connection with the cars at the present garden show evidences more progressive than that of the manufacture of enclosed cars. More than ever before has the limousine become a body of masses as well as the classes. The double-body program, an open one for the summer season and a closed one for the winter, is now with us. Enclosed cars are being used more this season than ever before. A year or so ago it was only the big, high-priced makers who built limousines, but today the chassis of 1,500 cars are being fitted with them. Today limousines are being built for the middle-man's car, and in this way the progress of the industry is showing itself.

The personnel of the A. L. A. M., in so far as the garden show is concerned, has not changed much during the year. The Waltham license has passed into the hands of the White Co., which is showing for the first time a gasoline car in addition to its steam line. In place of the Pope-Toledo comes the Overland line, which secured admission through the Pope-Toledo deal. With the Overland type comes the Marion, also. Both Buick and Oldsmobile, controlled by the General Motors, are back in the fold. The Hudson is a new face, as is the Flanders. The Everitt, the new car which has just been brought out in Detroit, now is in the A. L. A. M. ranks, although it is not being exhibited in the garden. Searching through the list of A. L. A. M. members, one fails to find the name of the Metzger Motor Car Co., for the reason that it has followed the example of the White and Overland and has entered the A. L. A. M. through having purchased the business of the Hewitt company, which heretofore has confined itself to the manufacture of commercial machines. The fact that three such powerful concerns adopted this method of gaining admittance to the ranks of the Seldenites is taken as a straw showing in which way the A. L. A. M. wind is blowing, for if the licensed association intended to drop the bars and admit all comers, surely such cars as the White, Overland and Everitt would not adopt the tactics they have.

It is only last week that the Seldenites increased their membership by the admission of several others of the A. M. C. M. A., the last meeting of the executive committee of the veteran body being



followed by the announcement that the National, Lambert, Brush, Marmon, Moline, Moon, Glide and Regal have been granted Selden licenses. Added to the others that were let in a couple of months back —Reo, Maxwell, Mitchell, Premier, Stoddard-Dayton and Jackson—gives the A. L. A. M. several strong recruits from the ranks of the independents. It was reported at the time that the Regal had been let in with the others, but last week's announcement would seem to show that this was premature.

Surveying the field of technical change during the past year, there are few changes met with in the garden that have not been noted in the palace show. The en bloc motor has the thin edge of the wedge entered in the small or medium-priced car field; in this field thermo-syphon cooling is gaining; magnetic ignition has taken the lead in all classes, and the dual system has been a big gainer, generally at the expense of the double system. There is no mistaking the advance being made in the circulating system of oiling for motors. Cellular coolers are gaining with many builders of cars at $2,000 or over; the dry-disk clutch has gained a couple of new adherents; the adjustable roller bearing has added to its field in the front road wheels and rear axle; the plain-bearing crankshaft is as firmly entrenched as ever, and ball bearings are stronger than ever in gearsets, rear axles and in magnetos, clutches and for pump shafts.

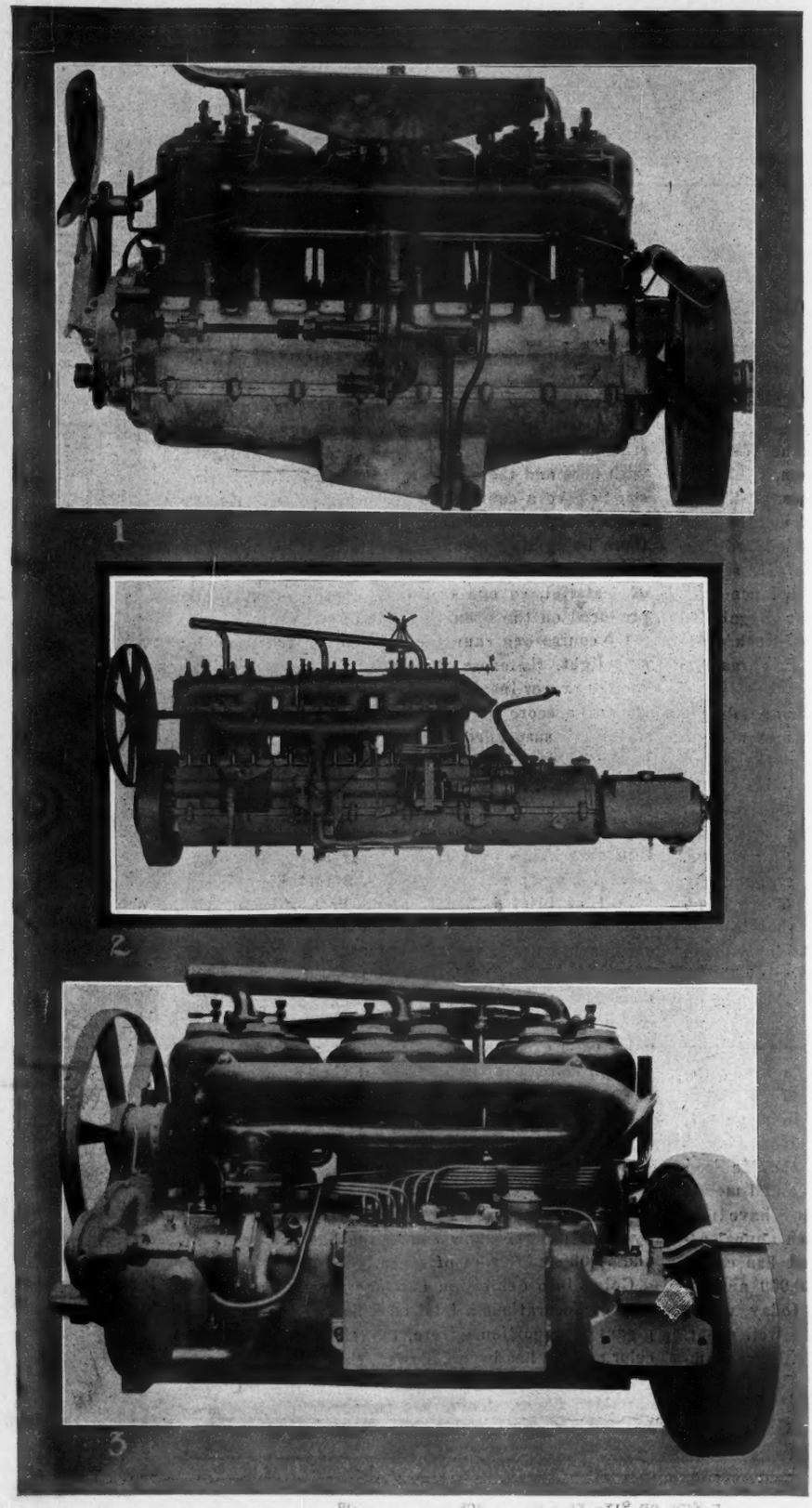
Never before did the promoters of the Madison Square garden show spend so much time and money in preparing their exhibition than they have this year, which is the occasion of the tenth annual affair. The decoration scheme employed has called for the expenditure of more than $30,000 and an advance peep into the big building today would seem to show that the money has been well spent. The designer of the scheme has taken a Roman ampitheater for his theme, and in such a dignified setting he has prepared backgrounds for the exhibits which promise to be fully up to expectations. So successfully has he worked that the bare walls, steel girders and balconies have been hidden, and it only requires a person of vivid imagination to be carried back to the exciting times on the concourse of the Circus Maximus. In brief, the designer has sought to bring about a general impression of spaciousness and a roomy effect has been secured with the lay-out of the exhibitors' spaces, the galleries, elevated platform, railing and signs.

There is nothing cheap or tawdry about the scheme, and the dominant colors are white and gold, with here and there a sprinkling of green and crimson to give a contrast to the other colors. As one looks aloft he sees a huge canopy of azure blue, there being tiny incandescent lamps doing duty as stars. In this huge canopy there are 7,000 yards of material, so one can imagine the effect to be produced on the opening night of the show.

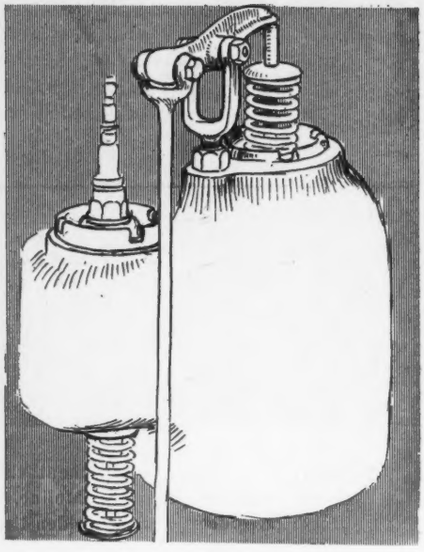
Of course one cannot expect to see the show by star light, therefore the promoters have provided for the proper inspection of the cars by the installation of a score of arc lamps with colored shades, which are suspended from the roof. To lend itself to the general outdoor effect which is sought, there is a light green carpet covering the exhibition spaces of the main floor and elevated platform, more than 6,000 yards of this being required. One feature that hangs over from a year ago is the ornamental lamp post, one of each, 8 feet high, being placed at brief intervals along both sides of the aisles and extending the length of the arena. On each lamp post is the name of the exhibiting concern, and fifty of these lamps are used on the main floor and thirty on the platform. Thirty Doric columns, each 25 feet high, are placed around the outer edge of the elevated platform and on the top of each column is the emblem of the show, a wheel surrounded by an American eagle. Swinging from massive chains hanging along the column fronts are green bronze lamps on brackets. The columns are white and the emblems old gold and illuminated by means of tiny incandescents. These columns combine the useful as well as the ornamental, for by their use the show committee has been able to add 7,000 square feet of space.

Going into exhibition hall one finds there in the way of decorations a latticed arbor with an arch of gigantic proportion. Here, too, the gold and white color scheme has been followed, the arbor woodwork being white, while the walls are finished with golden cartridge paper. There are twenty-four white sunbursts hanging from the arbor.

The A·L·A·M· 1910 MOTORS



1—Showing Features of Pierce-Arrow Lubrication System
2—Unit Power Plant of Stevens-Duryea Model Y, Left Side
3—Thomas Little Six, Showing Features of Cooling and Oiling Systems



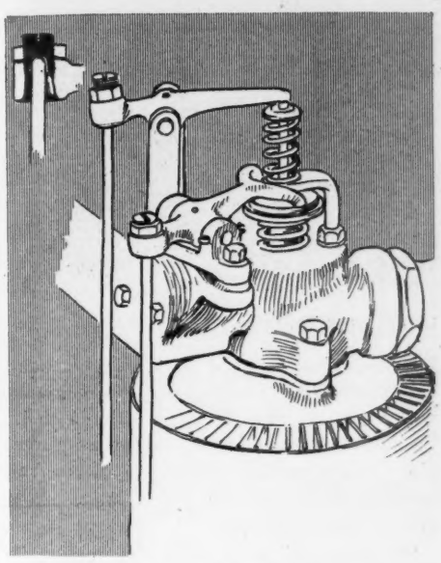
Chalmers 30 Intake Valve

AT the first glance the progress made in the last year in the manufacture and designs of motors in the Selden ranks has not been very pronounced. There are no fewer than thirty-five models of cars shown in the garden this week in which the bore and stroke are identical with last year, a fact which is indicative of the settled condition of many of the factories, the designing forces feeling apparently that the problem of apportioning or proportioning motor size to car-carrying capacity and road conditions has with the Selden army been fairly well settled.

It is interesting to note that such concerns as the following are marketing their 1910 cars without a change in either the bore or stroke, the following tabulation showing both of these motor sizes:

	Bore	Stroke
Packard	4 1-16	5⅛
Packard	5	5½
Locomobile	4½	4½
Locomobile	5	6
Peerless	4⅞	5½
Pierce	4½	4¾
Winton	4½	5
Winton	5	5
Stearns	4½	4⅝
Stearns	5⅜	5⅞
Knox	5½	5½
Stevens-Duryea	4¾	4½
Pope-Hartford	4 5-16	5⅛
Corbin	4½	4¼
Chalmers 40	5	4¾
Franklin	3⅜	4
Franklin	4¼	4
Studebaker-Garford	4¾	5¼
Palmer & Singer	4¼	4½
Palmer & Singer	4⅞	5½
Royal Tourist	5½	6
Thomas	5¾	5½
Thomas	5½	5½
Thomas	3⅜	4 5-16
Elmore	4½	4
Lozier six	4⅝	5½
Lozier six	3¾	4½
Matheson six	4½	5
Matheson four	5	6
Oldsmobile six	4¾	4¾
Buick	3¾	3¾
Buick	4½	5
Apperson	4⅝	5
Apperson	4¾	5
Apperson	4½	5

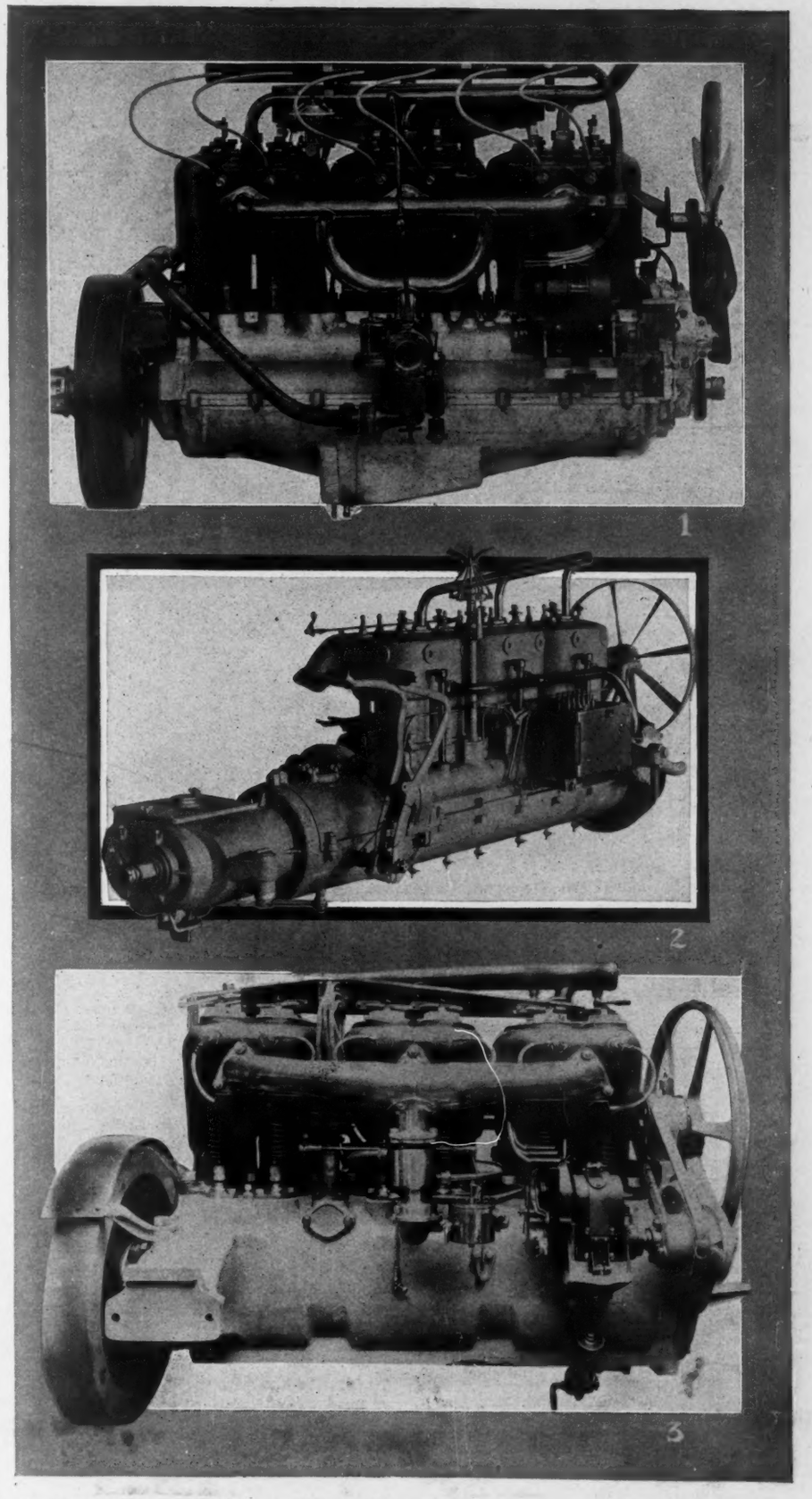
Their HORSEPOWER and TREND



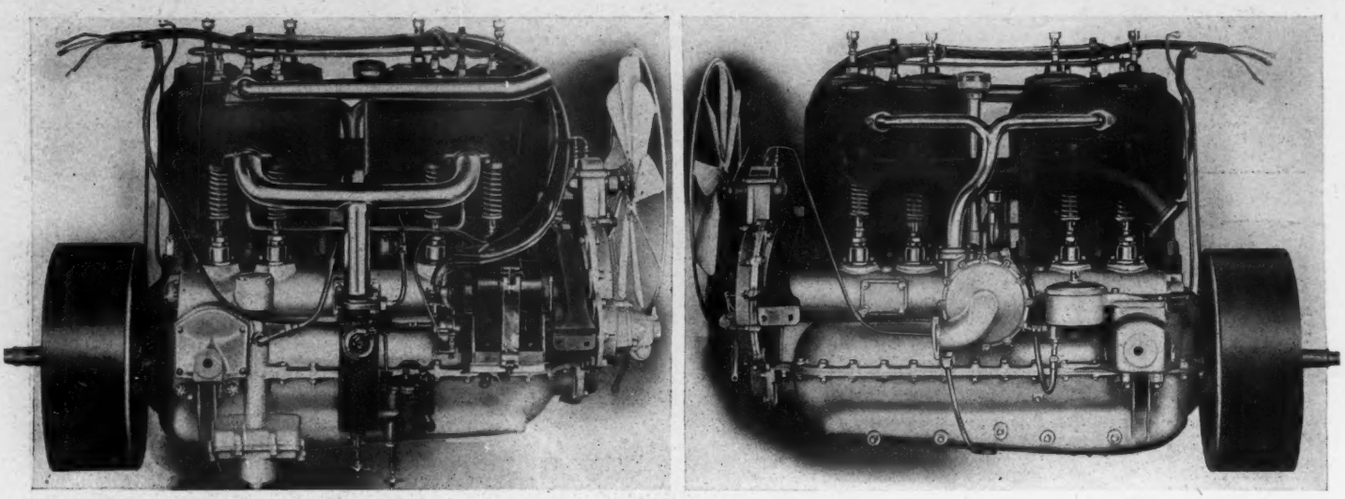
FRANKLIN CONCENTRIC VALVES

This tabulation tells a remarkable story, as it means that practically 60 per cent of the 1909 motors are continued without change so far as cylinder dimensions are concerned. Of these, thirty-five models have motor measurements as they were; twenty-five of them are made with the stroke slightly longer than the bore; but six of them have the square cylinder, namely, with the bore and stroke measuring the same; and there are but seven cases in which the bore is in excess of the stroke, the makes representative of this feature of construction being Stevens-Duryea, one model; Pope-Hartford; Corbin; Chalmers 40; Franklin, one model; Thomas, one model; Elmore. This practically is conclusive proof that that design in which the bore is made to exceed the piston stroke is in the minority, and also that the square cylinder is not very popular, but that that design specially sought after is in which the stroke slightly exceeds the bore. Roughly speaking, in Packard models the stroke is ½ inch in excess of the bore, and in other makes it is approximately as follows: Locomobile, one model, 1 inch, other square; Peerless, ⅝ inch; Pierce, ¼ inch; Winton, one model, ½ inch, other model square; Stearns, one model, ⅛ inch, large model, ½ inch; Franklin, one model, ⅝ inch; Studebaker-Garford, ½ inch; Palmer & Singer, ¼ inch one model, ⅝ inch other model; Royal Tourist, ½ inch; Matheson, ½ to 1 inch; Apperson, ¼ to ⅝ inch.

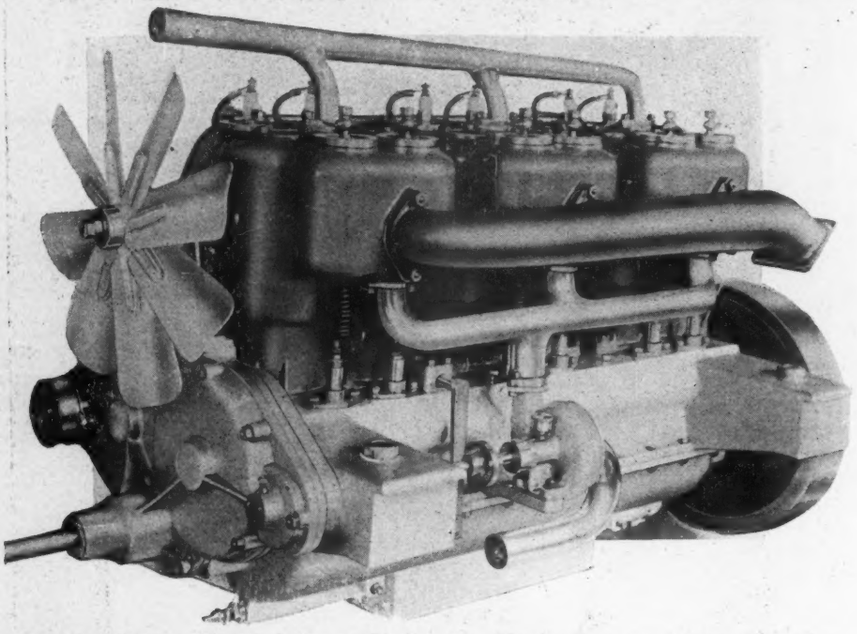
Turning next but briefly to those 1909 models which have been carried into the 1910 field, but with some changes made either in the bore or stroke of the cylinders, it is not uninteresting to learn that there are very few instances where the



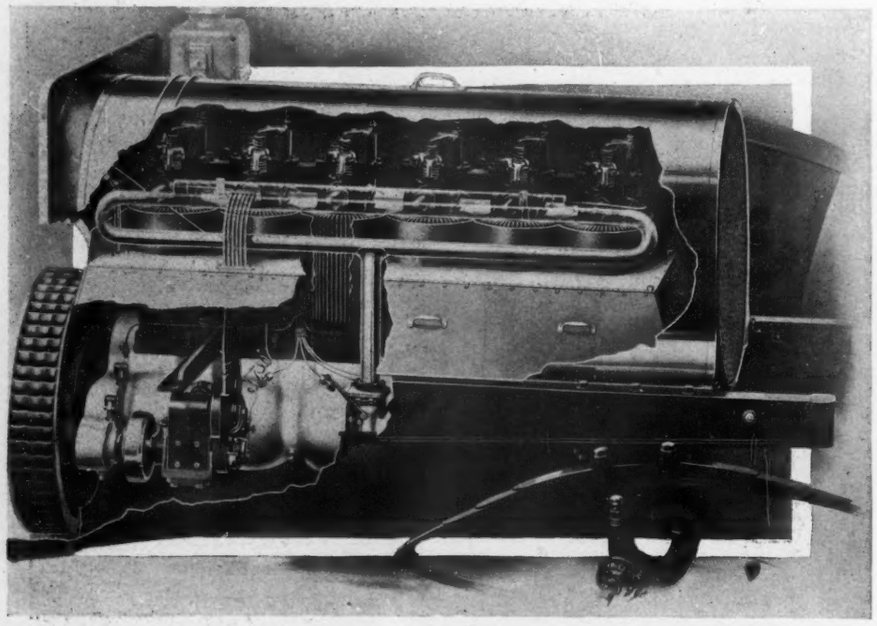
1—INTAKE SIDE OF SIX-CYLINDER PIERCE-ARROW MOTOR
2—RIGHT SIDE OF STEVENS-DURYEA UNIT SIX-CYLINDER POWER PLANT
3—INTAKE SIDE OF THOMAS, SHOWING OIL CUP TO TEST LEVEL IN CRANKCASE



RIGHT AND LEFT SIDE OF ROYAL TOURIST MOTOR ON MODEL M, 1910 CARS, SHOWING MANY INTERESTING DETAILS OF CONSTRUCTION



EXHAUST SIDE OF PALMER & SINGER SIX-CYLINDER MOTOR, SHOWING COOLING FEATURES



NEW FRANKLIN SIX WITH INTEGUMENT CUT TO SHOW DETAILS OF POWER PLANT

increase in the size has been brought about by lengthening the stroke. An example will suffice in this category: The Alco in two models has increased the stroke from 5½ inches to 5⅞ inches, the bore remaining at 4¾ inches.

Motor Power Increased

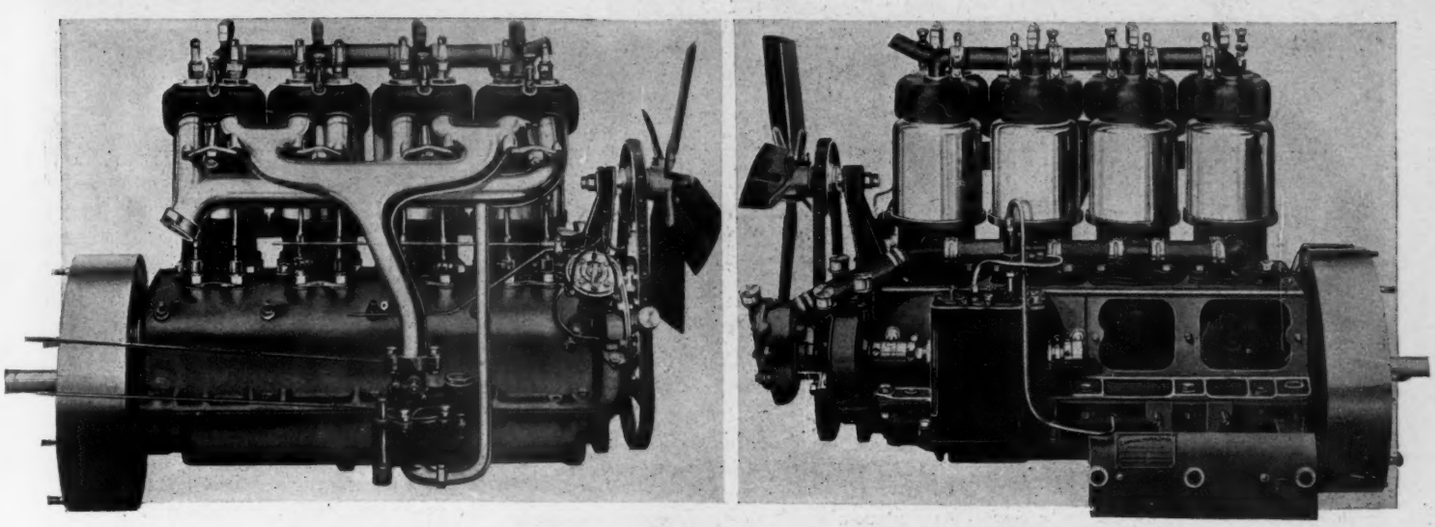
On the other hand, there are numerous examples of where the motor power has been added to, but in every place it has been the cylinder bore that has been increased, the stroke remaining unaltered, some of these examples being:

Apperson was.....5½x5 , now is 5¾x5
Cadillac was.....4 x4½, now is 4¼x4½
Chalmers 30 was.....3⅞x4½, now is 4 x4½
Knox was.....4⅞x4¾, now is 5 x4¾
Lozier four was.....5¼x5¼, now is 5⅜x5¼
Overland was.....3½x4½, now is 3¾x4½
Overland was.....4 x4½, now is 4¼x4½

In spite of the fact that in these particular models the bores have been added to for 1910, in the majority of cases the stroke is still slightly in excess of the bore, there being a few cases, however, in which the bore leads. The fact that seven models have been increased by adding to the bore, in comparison with one by adding to the stroke, can be interpreted as indicating the confidence many manufacturers still retain in the motor with a good big bore.

In a still further analysis of the 1910 motor, the fact is brought out that there are but a couple of concerns that have been reducing the size of the motor, this presumably being done in these cases because of a reduction in the price of the car, and in one case at least in the fitting of a smaller body. The Haynes motor has been reduced from 4¾ by 5 last year to 4¼ by 5 for this year, this cutting off of ½ inch off the bore being a considerable reduction and making the motor one of the long-stroke varieties. The other motor which has been reduced is that of the Autocar, its reduction being from 4¼ by 4¾ to 4 by 4½ inches bore and stroke respectively. This reduction points but slightly in the direction of the long-stroke type.

Lastly in the motor change phase of the problem there is a class of motors which have been increased for this season, but



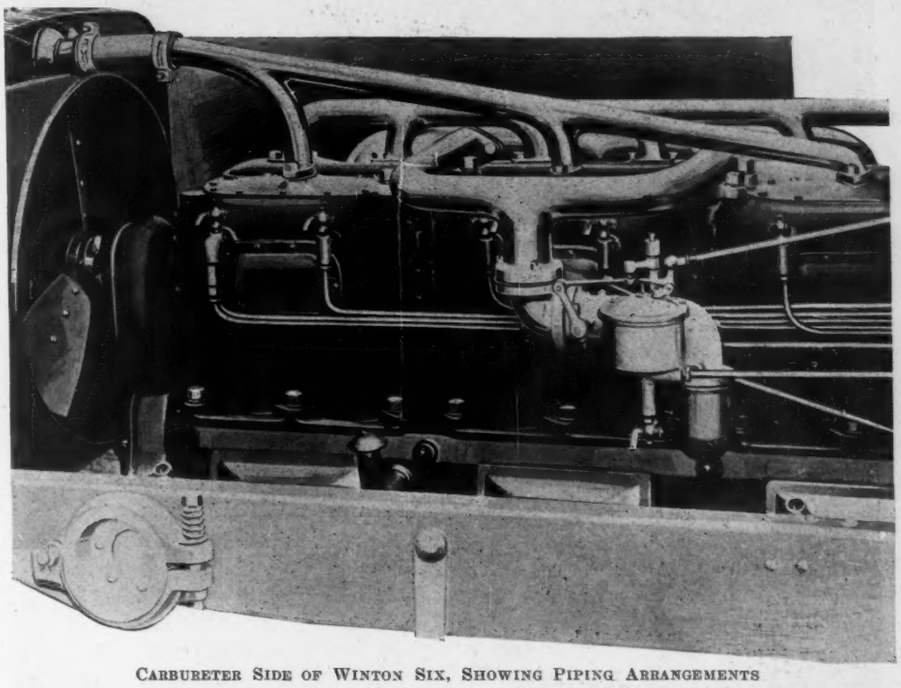
RIGHT AND LEFT SIDES OF CADILLAC 30 MOTOR—REAR INSPECTION PLATE REMOVED FROM LEFT SIDE

the change has been in some cases by adding to both the bore and stroke, and in other cases by adding to one and subtracting from the other. In one Stevens-Duryea model six the designer has cut from the bore and added to the stroke as follows: In 1909 measurements were 4⅜ by 4½; in 1910 they are 4¼ by 4¾. In the Thomas little six both bore and stroke have been added to, and in this case the car has been practically redesigned. On the Selden car both have been increased, the bore by ¼ inch and the stroke by ½ inch.

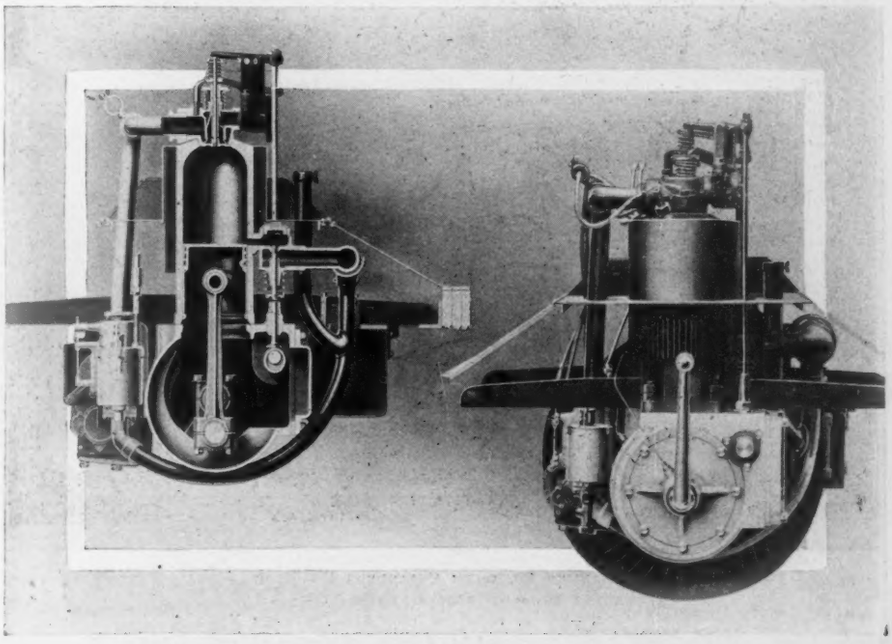
New Motors Brought Out

Before proceeding to an analysis of the several motors of the Selden ranks for this season, a word must be said regarding the new motors that are out at a show for the first time. Of this class none will create more attention than the new White gasoline type, not only because it is the first gasoline motor this reputable builder of steam cars has turned out, but further because it is the leader in America of the long-stroke type, its measurements being bore 3¾ inches and stroke 5⅛ inches. The stroke is 1⅜ inches longer than the bore. This motor merits attention because of the simplicity that has been accomplished in the matter of intake and exhaust manifolds as well as water pipes. The intake is not a manifold at all, but a single pipe from the carbureter to the en bloc cylinder casting, and the same can be said about the exhaust pipe. In the water circulation scheme there is but one pipe leading to and another leading from the one jacket space. The Chalmers 30, now in its second year before the American public, has semi-like incorporated the intake manifold with the cylinder casting, but the design remains a Y and so cannot be considered the simplification that is shown in the White. In the new Hudson motor the four cylinders are cast en bloc, but the usual intake and exhaust manifolds are adhered to.

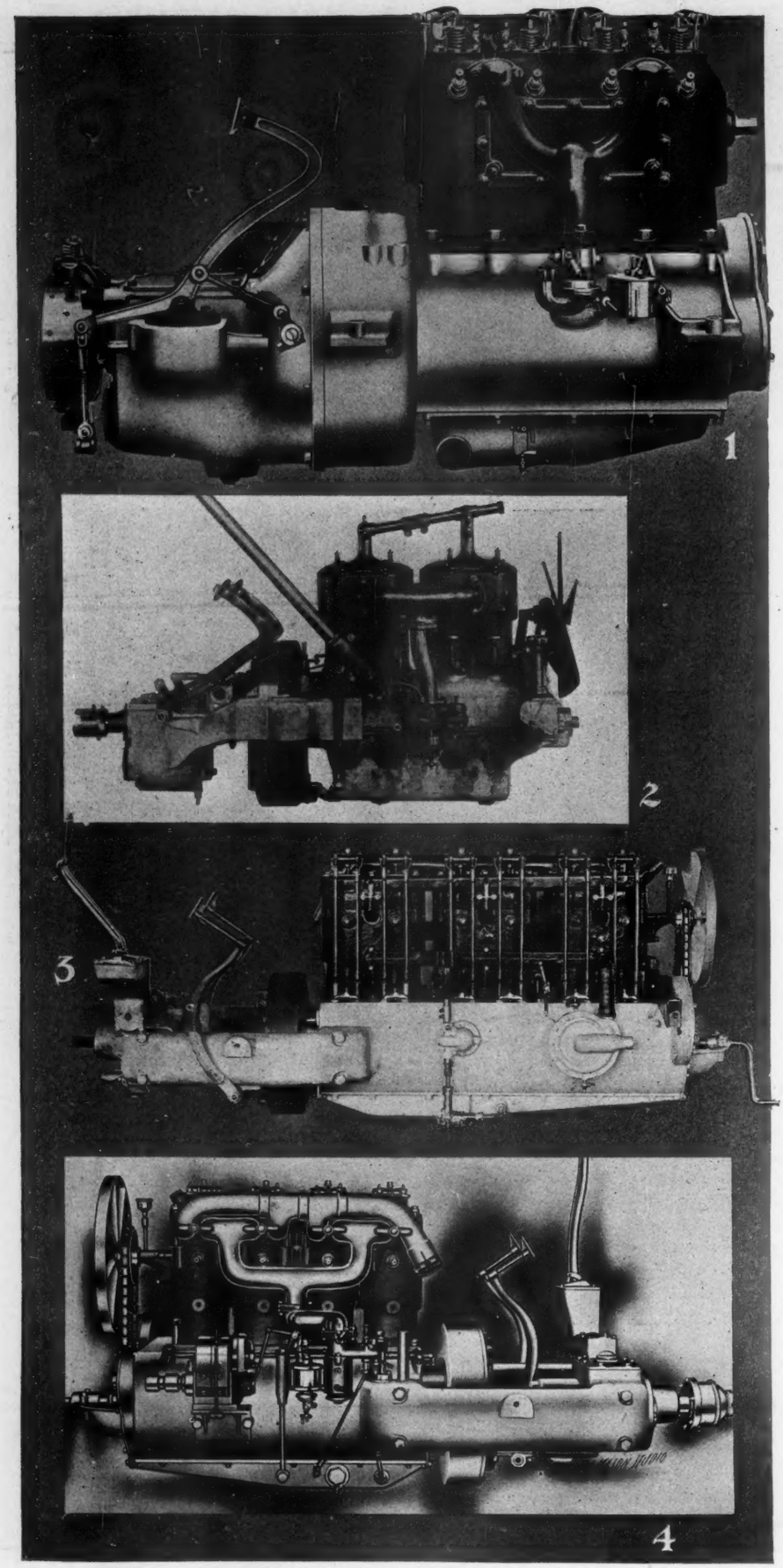
Another practically new motor is the Haynes, illustrated herewith, which is con-



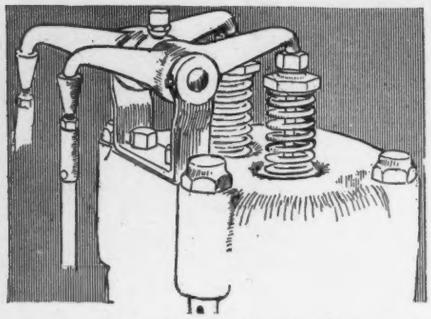
CARBURETER SIDE OF WINTON SIX, SHOWING PIPING ARRANGEMENTS



END SECTION AND FRONT VIEW OF FRANKLIN AIR-COOLED MOTOR



1—Intake Side Chalmer 30, with Cylinders En Bloc
2—Carbureter Side of New Haynes
3—Right Side of New Six-Cylinder Knox 4
4—Left Side of Four-Cylinder Knox



Knox Valve-in-Head Arrangements

ventional with its cylinders in pairs with opposite valves; but the gearbox is now a unit with the motor, the lubricating system is a circulating one incorporated within the crankcase, which is made with a basement oil tank, and the double flywheel scheme used on these motors for a couple of seasons has been discontinued, only the flywheel at the rear being retained.

The motor on the Thomas little six has been redesigned. It will be recalled that last year this motor had its six cylinders in two groups of three each, but for this season they are cast in pairs, and copious waterjacketing spaces have been added, and the bearing surface of the crankshaft is particularly liberal. A leading feature of it is the long stroke, the measurements being 3⅜ by 4 5/16 bore and stroke, respectively, the stroke being 1/16 the longer. The clearance between the valve tappets and the bottoms of the valve stems has been reduced to .004 inch, so that noise should be reduced by this measure.

The Franklin motor has been redesigned only in so far as the air-cooling features of it are considered. Heretofore the cylinders have been coiled by circular flanges, the number of flanges on the cylinder varying with the position of the cylinder. To begin with, for this year the circular flange has been discontinued and the vertical flange substituted; but the change goes much further than this. Each cylinder now is jacketed outside of the flanges and a sheet metal compartment is built around all four cylinders, making it imperative that all air drawn in through the open front end of the bonnet must enter the open tops of the air-jackets and pass down between the vertical flanges on the cylinder. This done, the flywheel, made with a turbine-like periphery, acts as a strong suction fan, provoking the air current in this direction. As the illustration shows, the magneto, carbureter and lubricator are located beneath the sheet metal compartment built around the four or six of the motor cylinders, but the providing of hinged doors offers every facility for reaching these parts.

Elmore Motor Redesigned

The two-cycle Elmore motor has been redesigned, although it continues to operate on the two-cycle principle. This motor is now made with a differential piston—that is, a piston of two diameters, one diameter at the top end, and a much larger one

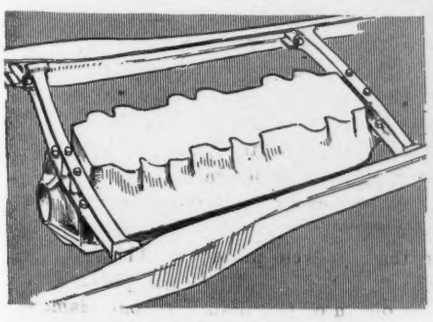
at the bottom end. Because of this the cylinder is made of two diameters. The reason of all this is that means are provided to pump the explosive mixture into the cylinders, so that the probability of not securing an adequate supply of explosive mixture is prevented. The top part of the cylinder, 4½ inches in diameter, may be designated the explosive part, and the lower end, 6½ inches in diameter, is the compressor end. The incoming mixture enters the annular chamber in which the compressor end of the piston works during the down stroke of the piston, being admitted through what may be designated a rotary valve in the intake manifold. This takes place in each cylinder, and by a distributer this compressed mixture is delivered to the cylinder on the suction stroke. The other Elmore motor continues as before, being of the three-port type.

The Knox company, although retaining its special motor design, has brought out a six-cylinder type, this model making its debut on the occasion of the national stock chassis race at Lowell, Mass., during the past autumn. The design of this is practically identical with that of the four, in that it has cylinders with detachable heads and the intake and exhaust valves located in the heads and operated by tappets and overhead rocker arms. This six differs from the Knox fours, however, in that it casts the cylinders in pairs instead of singly. Apart from this, the location of magneto, water pump and carbureter is the same, and the motor is a unit with the gearbox.

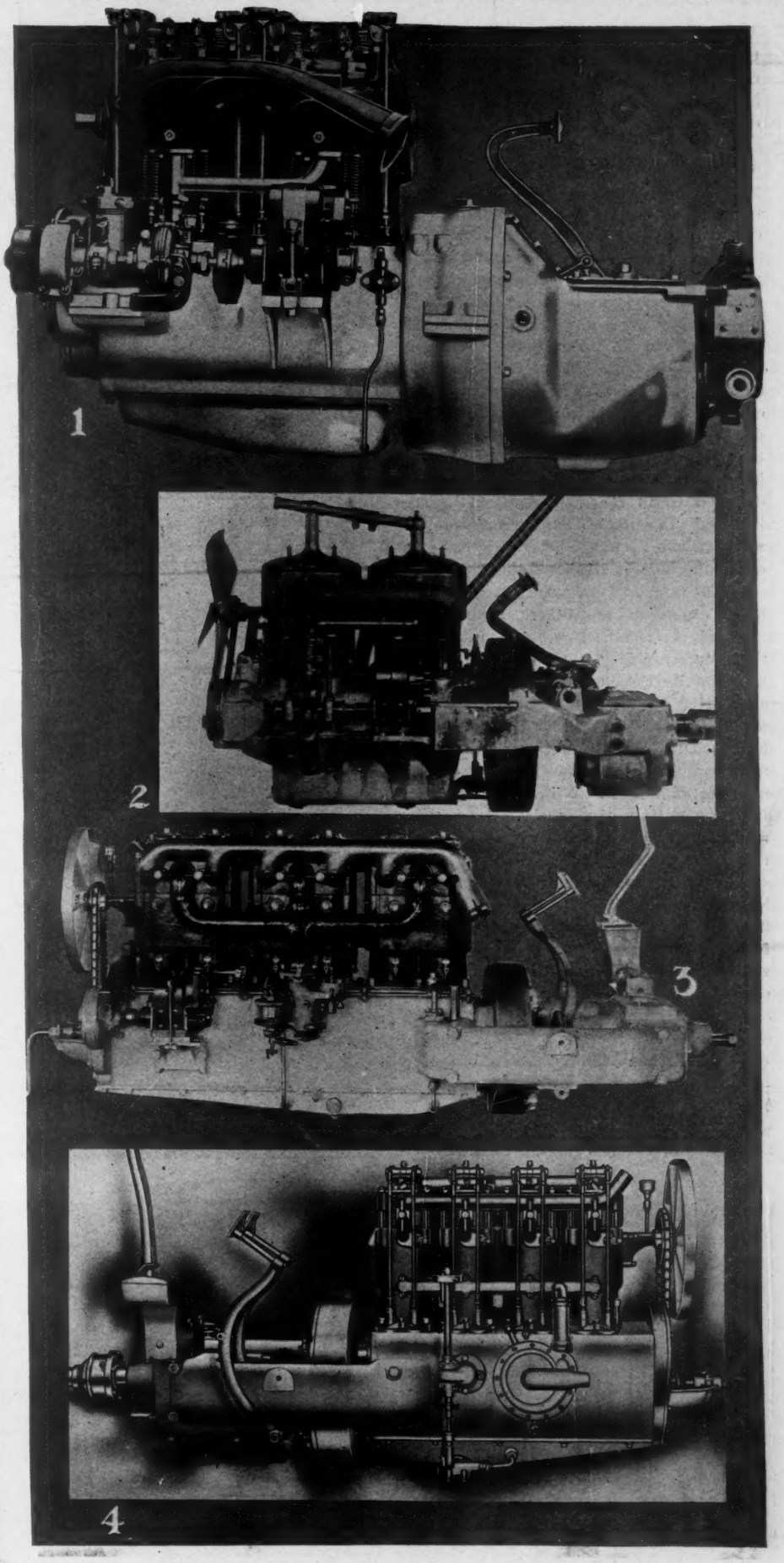
One of the new motors of the year is the Hudson, illustrated herewith. This is a very conventional type of motor, with L cylinders, both sets of valves being located on the right side and operated from one camshaft within the crankcase. The timing gears are well encased, and the fan is supported on a pedestal on the timing-gear casing. The circulating system of lubrication is used, the base of the crankcase having an oil reservoir.

Seek To Quiet Motors

With those concerns that have not brought out new motors, more or less changes have been made, not a few of these being with the object of reducing noise, this apparently being the big bugbear with so many manufacturers. Practically 50 per cent of the builders who heretofore have used spur gears on the camshafts



PIERCE-ARROW MOTOR SUSPENSION

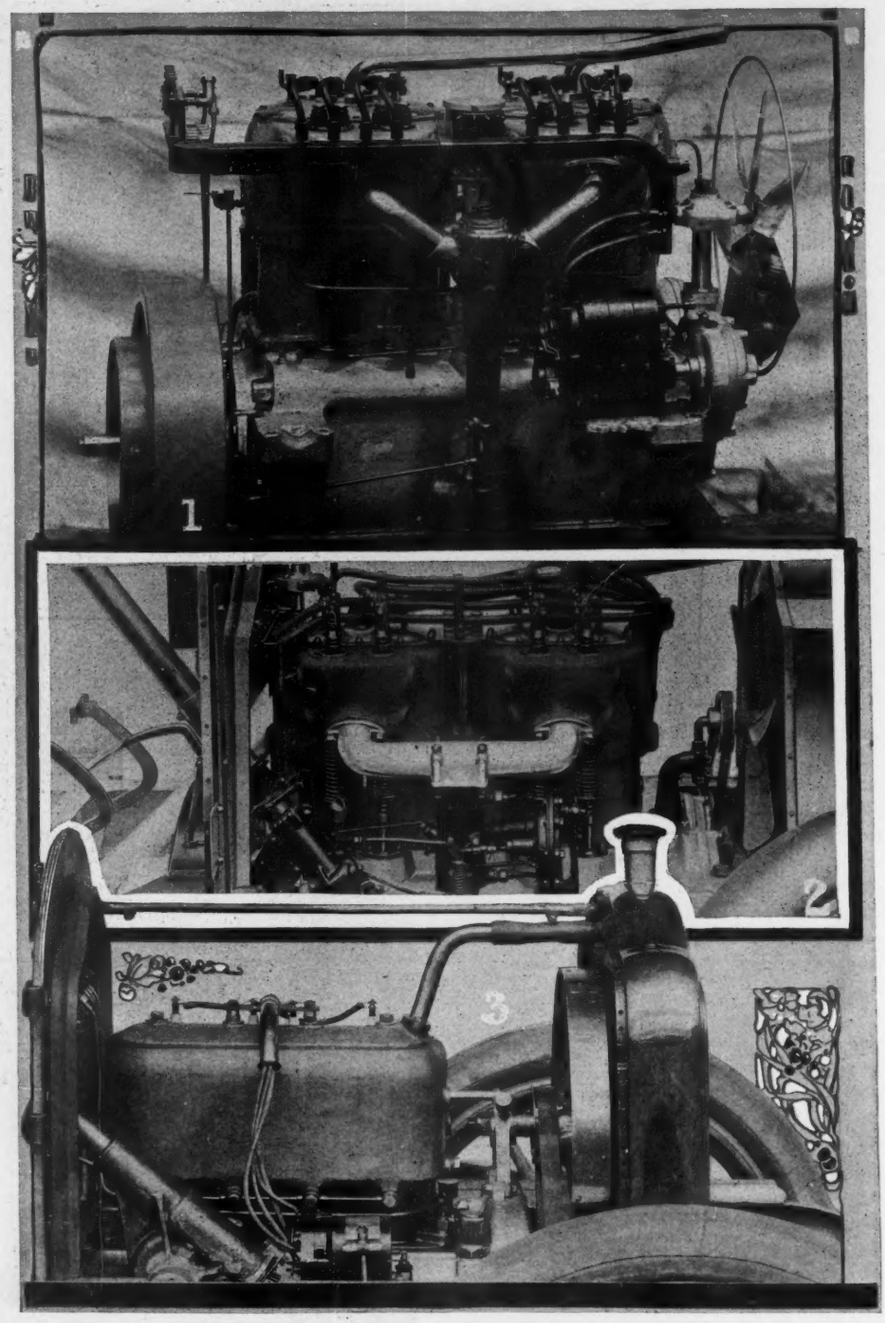


1—EXHAUST SIDE CHALMERS 30
2—UNIT CONSTRUCTION OF NEW HAYNES POWER PLANT
3—UNIT POWER PLANT OF NEW SIX-CYLINDER KNOX
4—POWER PLANT OF FOUR-CYLINDER KNOX

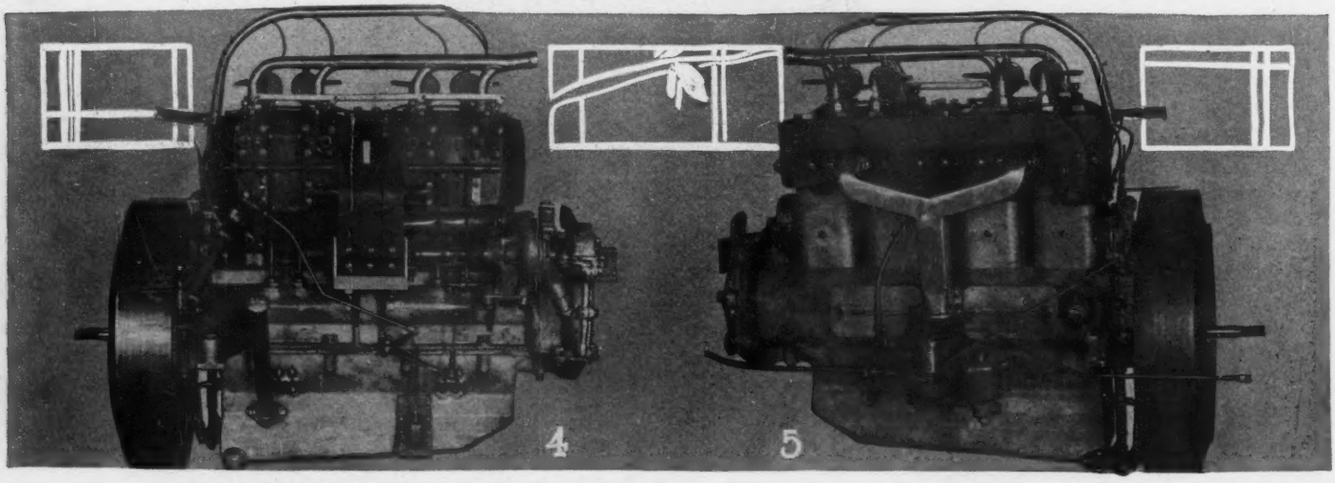
and crankshaft have introduced the helical type, with the noise-elimination problem constantly before them. Several others have reduced the clearance between the ends of the valve tappets and the ends of the valve rockers. Whereas last year a clearance of as high as .018 inch was permitted, this has in not a few cases been reduced to .004 inch, which is a most considerable reduction.

It is almost an impossible problem with many of the licensed makers to discover what changes have been made either in the diameter of the valves, the lift given them and the timing of them, as well as alterations in the profile of the intake and exhaust cams. These are most important considerations in the working out of motor-power increase, and it is safe to predict that when all of this information shall have been secured it will in no small degree account for why some of the makers say the power has been increased and yet not a change has been made in either the bore or stroke of the motor.

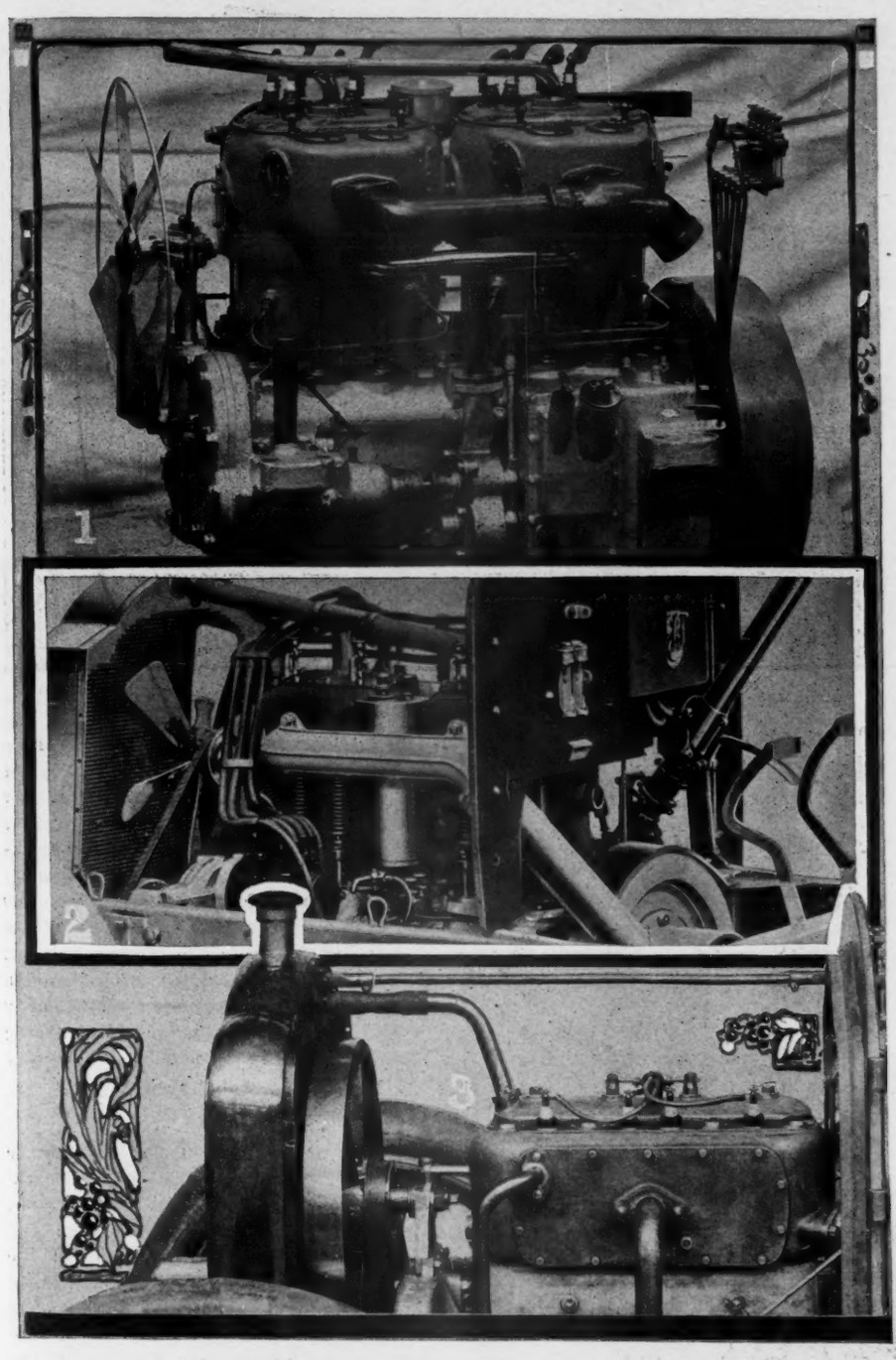
It is most apropos here to mention briefly some of the other changes that might in no small degree account for a slight increase in power. First comes the adoption by three or four makers of the circulating system of oil. The present demand for stock chassis races seems to have stimulated this lubrication improvement era which has been going along for a couple of seasons. With guarded tracks for road racing, the lubricating systems must be adequate for continued high-speed motor work, and with many of the oiling systems in vogue a year or so ago it would have been impossible to supply oil in sufficient quantities to maintain high speeds for long distances. This matter is being well taken care of, and it is surprising to see how few of the external mechanical oilers are in use at the present time in comparison with the number of cars using one form or another of the circulating, or



1—Peerless, Showing New Carbureter
2—Packard 30, Intake Side of Motor
3—White, New Four-Cylinder En Bloc



4 and 5—Right and Left Sides of 1910 Columbia Motors, Showing Ignition System, Enclosed Valve Mechanisms



as some say, self-contained oiling system.

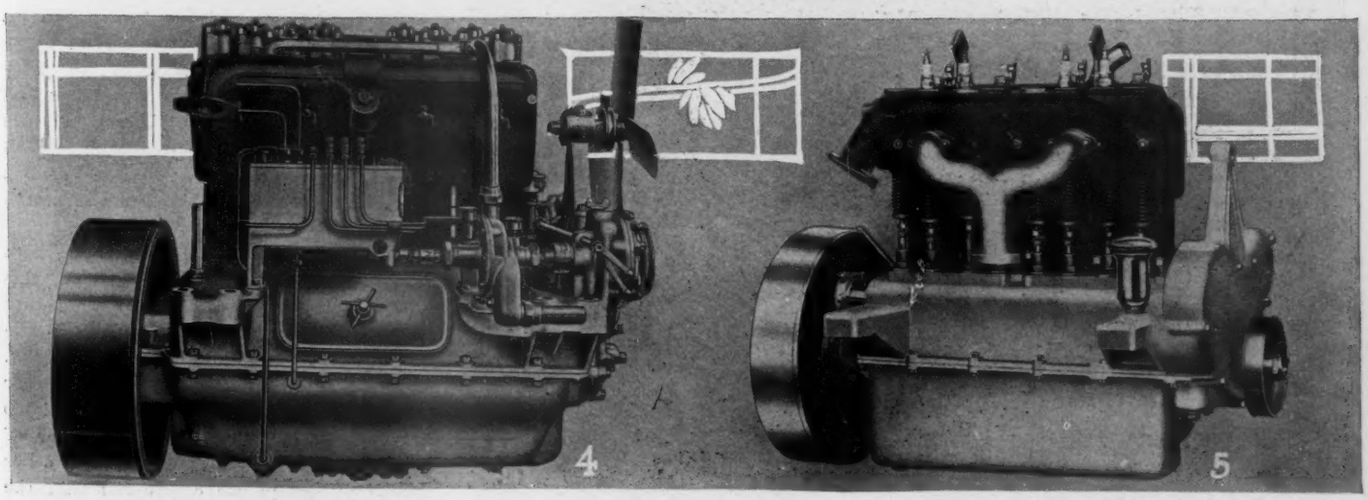
Then, too, carbureters have been altered. The Peerless has made many changes, so that now the intake manifold, which is a T, has been waterjacketed through the vertical part of it. With others makers who use their own carbureters the auxiliary air valve has been slightly changed and a few other details corrected.

Analysis of Engine Situation

As was done last week in these pages with reference to the motors of cars shown at the Grand Central palace show, so this week a brief analysis of all the licensed motors will be made in the succeeding paragraph, and towards the end a few comparisons are drawn between the licensed and unlicensed motors. It must be borne in mind that the figures given below are accurate in every respect, being compiled from statistics secured by Motor Age from all of the makers. In order to make comparisons possible to the greatest extent, the entire license field has been divided into four classes—the $1,000, $1,500, $2,500 and $4,000 cars—these figures broadly represent cars selling from $250 to $500 at each side of these figures, excepting in the $1,500 class, where $1,250 is the minimum price considered.

The $1,000 car of the A. L. A. M. ranks as a 22.5-horsepower machine with cylinders having 3.75-inch bore and 4.5-inch stroke, giving a piston displacement of 198.8 cubic inches. It is an even race among the three branches of foundry practice casting the cylinders individually, casting them in pairs, and casting them en bloc. The T-head variety has no followers whatever, all of them either allying themselves in the valve-in-the-head or L-head classes. Fifty per cent of them is cooled by thermo-syphon circulation, and the other 50 by pump circulation, there not being a single representative of the air-cooled classification. In the ignition field it is an even-handed strife between single

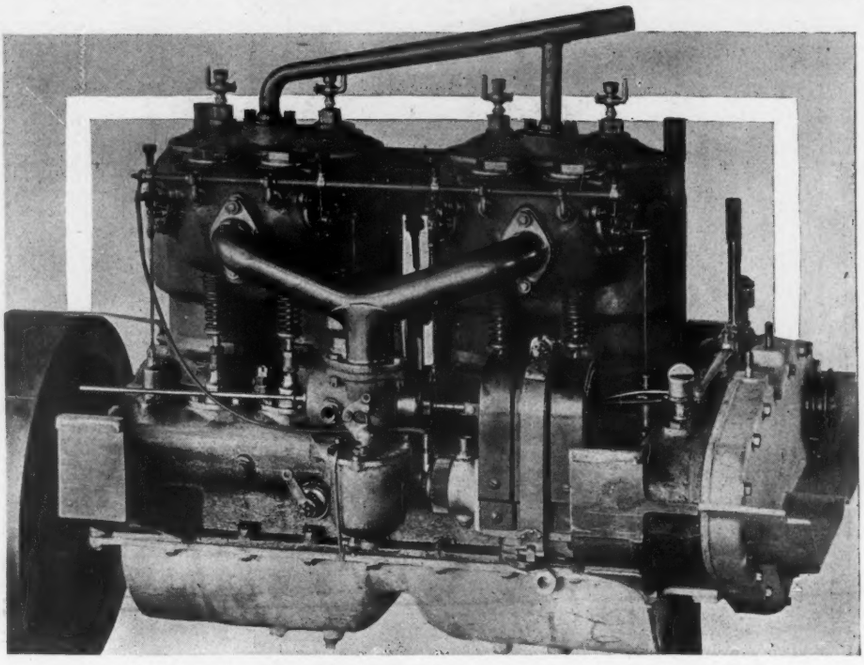
1—Exhaust Side of Peerless 1910 Motor
2—Showing Oil Reservoir on Packard
3—White Four-Cylinder Gasoline Engine



4 and 5—Pope-Hartford Valve in Head Motor, Showing Mechanical Oiler—Valve Side of 1910 Hudson

and dual ignition, the numbers breaking even in these two classes, with not a solitary example of double ignition or the use of the make-and-break spark. With them it is all gravity feed of the gasoline from the fuel tank to the carbureter, and they all, or 100 per cent, make use of the circulating system of oiling the motor.

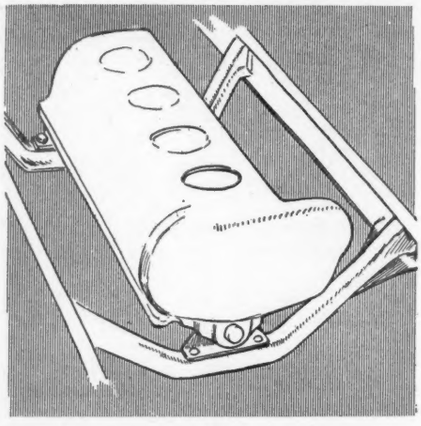
In the $1,500 car a few changes towards pump circulation in place of thermo-syphon, to separately cast cylinders, to double ignition, to pressure feed of the gasoline, are shown. The $1,500 car has a formula rating of 27.8 horsepower, with a bore of 4.17 inches and a stroke of 4.5 inches. This classification is essentially one of L types of cylinders, not the pure L type in which both valves are on the same side, but rather that type with one set of valves on the side and in some cases the intake valve in the center of the cylinder head. With this class it is a case of either casting cylinders separately or casting them en bloc, the former kind having a 67 per cent following, leaving 33 for the mono-block variety. Whereas with the $1,000 car thermo-syphoning was on an even basis with the pump circulation, in this class the pump system has jumped to the front, having 67 per cent of the following, leaving 33 for thermo-syphoning. This transition to the use of the pump in the ascending scale of prices is identically the same trend noted a week ago in the resume of the Grand Central palace cars.



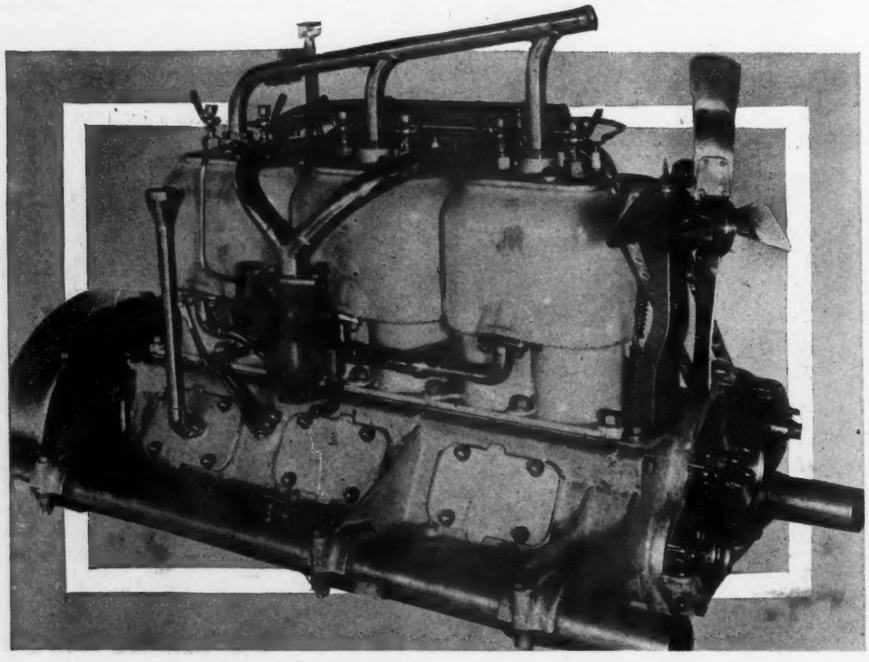
LOCOMOBILE MOTOR, SHOWING CARBURETING AND IGNITION SYSTEMS

Taking Up Ignition Phase

Passing to the ignition phase, the double system carries off the honors, with another 67 per cent following, leaving the 33 per cent to the dual clientele, this being the third successive example of the ranks splitting in a 67-to-33-per-cent division with casting of the cylinders, water-cooling and ignition schemes. For the first time in this analysis the pressure feed of gasoline makes its appearance to the tune of 33 per cent, leaving our old friend, the 67 per cent, as leader with its following of those using the gravity system. Lastly comes the brief consideration of the oiling or lubricating scheme in which the whole 100 per cent are recorded as followers of the circulating system in one form or another. This analysis of the $1,500 car has proven of special interest because of the harmony of design which prevails, the division being 67 and 33 per cent in four of the most important of the motor considerations.



CADILLAC CRANKCASE SUSPENSION

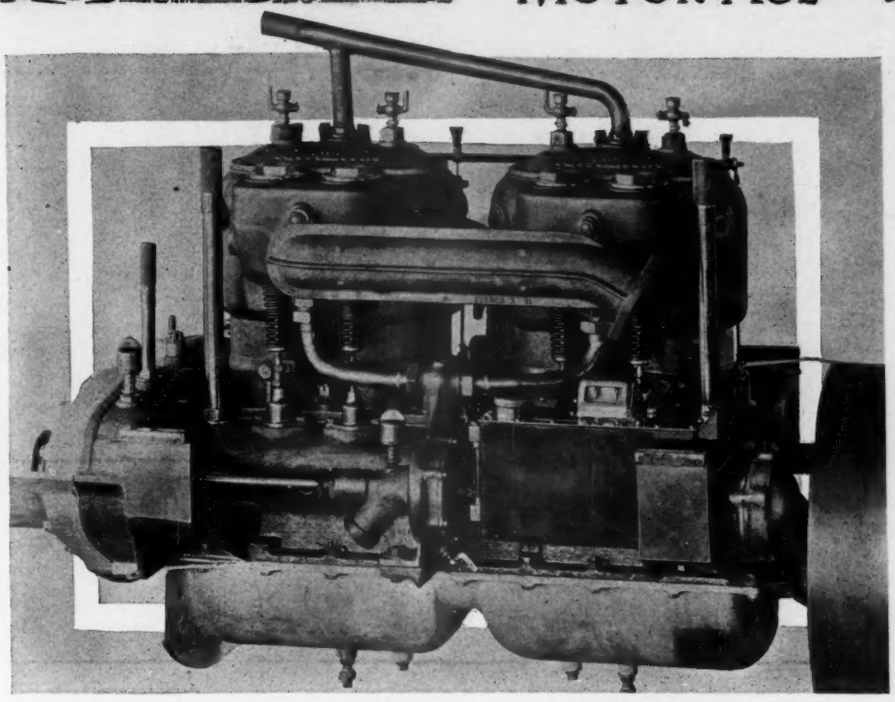


RIGHT SIDE OF LOZIER SMALL SIX WITH TIMING GEAR CASE COVER REMOVED

The $2,500 Car Class

Now comes the $2,500 car. It may be styled in a sense the transitory car, marking as it does the transition line between the medium-priced car on one hand and the luxurious, high-priced article on the other hand. Because of this we find introduced in it features of design not found in the $1,000 or $1,500 car, but which features become conspicuous ones in the $4,000 article. Thus we find for the first time a small representation of the T-head cylinder which is in the majority of the $4,000 class but not found in the two low-priced classifications; casting cylinders in pairs move up; waterpump circulation outdistances thermo-syphoning; double ignition gains and circulating lubrication is prominent.

The $2,500 car is 23.6 horsepower, with 4.2-inch bore and 4.6-inch stroke, this motor being very little larger than that found in the $1,500 car, so that if the motor power were the only price criterion it would be questionable if the $2,500 car would have much chance against its $1,500 brother. It is only when the matter of bearings used, steels employed and other details of design are considered that the price difference can be approximated. This



EXHAUST SIDE OF LOCOMOBILE MOTOR, SHOWING OILER, WATER PUMP ARRANGEMENT

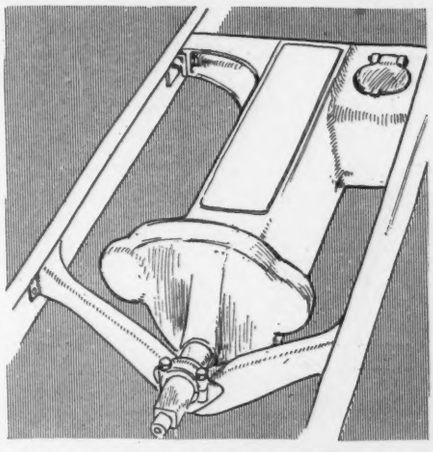
motor has a piston displacement of 261.2 cubic inches. In regard to the cylinder design, 50 per cent use the L head, 20 per cent the T head and 30 per cent are of other types, some with both valves in the head, some of the two-cycle type, and others with a mixed valve arrangement. We note an advance in the mode of casting—40 per cent casting in pairs, 40 per cent casting singly, and 20 per cent casting en bloc. This is practically the first example of a car in this class using the en bloc casting, there not being any example of this in the Grand Central palace ranks.

In the matter of cooling the cylinders, air-cooling makes its appearance, 10 per cent following this division, with the remaining 90 per cent divided between pump and thermo-syphoning—60 of the pump and 30 the thermo-syphon. This shows a reduction in the following of thero-syphoning as compared with the $1,000 or $1,500 classes.

Nothing but high-tension ignition is used, 50 per cent, or one-half, using single systems, 20 per cent dual systems, and 30 per cent double systems, by dual being meant a combination of magneto and either dry cell or battery. It is understood that in many of the single systems both dry cells and a storage battery are fitted. As high as 80 per cent uses the circulating system of oiling the motor, and 20 per cent continues with the mechanical oiler located on the motor base and driven by ratchet or other means from the motor.

The $4,000 Car Class

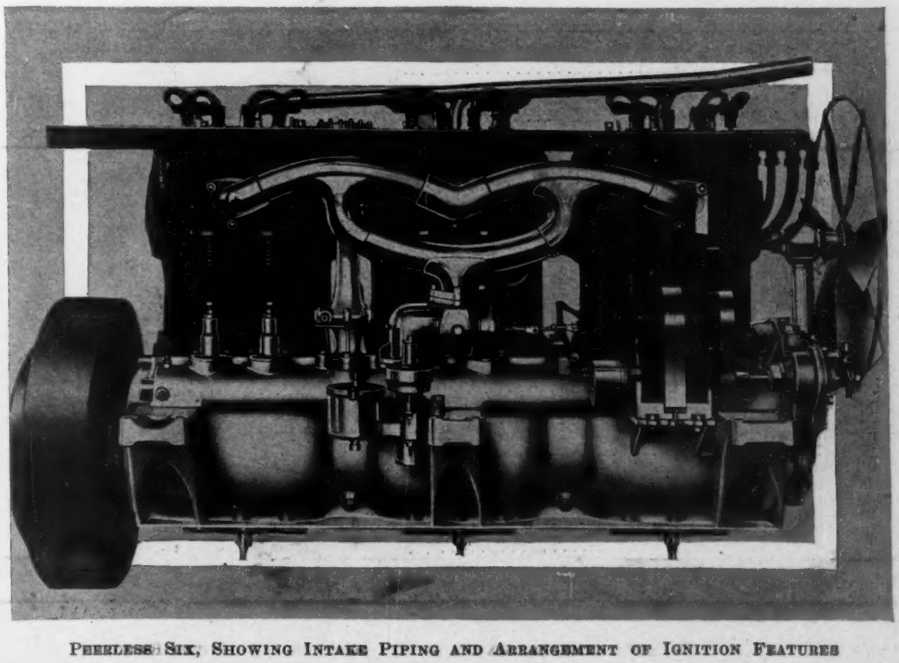
Lastly comes the $4,000 car, and it is in a class by itself as far as design is concerned, the same characteristics of design appearing in the licensed $4,000 cars as in many of the $4,000 cars of the unlicensed ranks. The motor in this car has a formula rating of 42.2 horsepower, with 4.7-inch bore and 5.06-inch stroke, this division being in favor of having the stroke longer than the bore. The piston displacement measures 424.7 cubic inches.



WHITE CRANKCASE FLEXIBLE SUPPORT

In the matter of casting the cylinders and the style of them, we see that symmetry and design are often considered ahead of price of manufacture, it being acknowledged that it is cheaper to build a motor with an L-type of cylinder than one with the T head. The L type requires but one camshaft, whereas the T head invariably demands a couple of them. Two camshafts cost more than one. In this division 51 per cent casts the cylinders with T heads, or opposite valves, as it may be styled; 27 per cent uses the L head; 14 per cent, the valve in the head, and 8 per cent is of the two-cycle following and cannot be classified.

This $4,000 car also records a victory for the cylinders cast in pairs, in that it has 69 per cent of the following, with 29 per cent cast separately and 2 per cent cast en bloc. In this class of car, thermo-syphoning drops entirely out of the running, leaving the race to the pump system and the air-cooled following, the latter constituting but 7 per cent. To pass along rapidly, it will suffice to state that double ignition, meaning with two sets of spark plugs and two entirely different systems of controlling and handling the current, takes the lead for the first time, with a 47 per cent following, but is fairly closely followed by the dual type, with 30 per cent to its credit. The single high-tension system has a 16 per cent following; and the low-tension classification with the make-and-break spark appears for the first time with a 10 per cent clientele. Lastly, and briefly too, pressure feed on the gasoline has jumped to 40 per cent of the following; and in the matter of lubrication it is 7 per cent circulating system and 29 me-



PEERLESS SIX, SHOWING INTAKE PIPING AND ARRANGEMENT OF IGNITION FEATURES

chanical oiler on the outside of motor.

Now for a few brief comparisons of the four typical motors of the licensed ranks with the corresponding types in the ranks of the outsiders, many of whom today belong to the licensed category but exhibited their cars at the Grand Central palace show, so that the classification is made on the division of the two classes previous to the recent court decision which resulted in a veritable landslide to the Selden faction. First, with the $1,000 car in the Grand Palace show, it had a horsepower of 17.2, whereas the licensed product shows 22.5 horsepower. The $1,500 car showed: palace, 26.6 horsepower; licensed, 27.8. With the $2,500 machine it is: palace, 32.7; licensed, 28.6; and in the $4,000 class it is: palace, 51.1; licensed, 42.8. The horsepowers all are calculated on the formula adopted by the Association of Licensed Automobile Manufacturers and is obtained by squaring the bore in inches, multiplying by the number of cylinders and dividing by 2.5. This comparison shows the motors in the $1,000 and $1,500 cars in the palace to be slightly less than those in the licensed class, but places the motors of the $2,500 and $4,000 classes in the palace show in a higher-power class than those being shown this week in the garden. The lower horsepower in the palace $1,000 class is largely due to such small single-cylinder types as the Brush and another small car like the Metz, with which there is nothing to compare in the garden show.

Practically throughout the remainder of the features of these four classes the same tendencies appear in each show with varying differences in places. For example, the use of double ignition is more pronounced on the licensed cars of the $4,000 class; thermo-syphoning has a much larger following in all four types of cars as shown at the Grand Palace, which would seem to bear out the contentions heard from many quarters during the past year, that the unlicensed ranks have been doing more for the industry by way of trying out designs which are now proving popular in Europe than have those makers counted in the licensed ranks.

The licensed makers have had nothing on the unlicensed array in the matter of cylinder casting, the unlicensed army in the $4,000 class having 80 per cent with cylinders cast in pairs, as compared with 69 per cent in the licensed body. The en bloc casting has a much larger following with the independents, as has the valve-in-the-head motor.

Two More Join A. L. A. M. Ranks

NEW YORK, Jan. 4—Special telegram—An important announcement made today is that of two more firms being accepted into the licensed group, these being the Hupp Motor Car Co., of Detroit, Mich., manufacturer of the Hupmobile, and the Pierce Co., of Racine, Wis., maker of the Pierce models formerly designated as Pierce-Racine cars.

This makes sixteen new additions to this party by direct joining with the association and to these can be added the Metzger Motor Car Co., which bought out the Hewitt Co., thereby securing its license, the White Co., which secured the assets of the Waltham company, thus falling heir to its license and the Willys-Overland Co., which secured the Pope-Toledo license through the purchase of that factory and today counts the Overland and Marion cars in the licensed field. This makes fifty-four in all on the latest roster of the A. L. A. M., all of these not being members but many simply licensees and in no way participating in any dividends that the organization may from time to time see fit to declare. It is understood that all of the present concerns have got in on a basis of 8-10 of 1 per cent royalty on all cars manufactured to date.

THE FOUR AVERAGE MOTORS OF THE A. L. A. M. AND A. M. C. M. A. SHOWS

	A. L. A. M.				A. M. C. M. A.			
AVERAGE—	$1,000	$1,500	$2,500	$4,000	$1,000	$1,500	$2,500	$4,000
Wheel base, inches	101	109	112	122	92	109	114	126
Front wheel, inches	32.0/3.3	34.0/3.7	33.8/4.0	35.6/4.2	30.6/3.1	33.3/3.5	34.7/4.0	36.3/4.2
Rear wheel, inches	32.0/3.5	34.0/3.7	34.0/4.0	35.6/4.5	30.5/3.1	33.3/3.6	34.8/4.1	36.3/4.5
Price of car	$975	$1,500	$2,155	$4,033	$784	$1,360	$2,133	$3,800
MOTOR—								
Number of cylinders—One					8%			
Two					23%	5%	4%	
Three								
Four	100%	100%	100%	62%	69%	90%	84%	60%
Five								
Six				38		5	12	40
Average bore, inches	3.75	4.17	4.2	4.7	3.83	4.10	4.41	4.82
Average stroke, inches	4.5	4.5	4.6	5.06	4.00	4.31	4.89	5.15
Average A. L. A. M. H. P.	22.5		28.6	42.2	17.2	26.6	32.7	51.1
Average piston displacement, cubic inches	198.8		261.2	424.7	129.2	226.2	314.5	448.2
Average T type, percentage			20	51	23	20	28	58
Average L type, percentage	100	100	50	27	61	75	56	26
Valves in head, percentage				14	15	5	8	20
Two-cycle, percentage			30	8			4	
Cylinders cast separately, percentage	50	67	40	29	54	50	24	20
Cylinders cast in pairs, percentage			40	69	23	35	76	80
Cylinders cast en bloc, percentage	50	33	20	2	23	15		
Water-cooled—thermo, percentage	50	33	30		85	45	20	7
Cir. pump, percentage	50	67	60	93	8	40	80	93
Air-cooled, percentage			10	7	8	15		
Ignition—H. T. single, percentage	50		50	16	39	15	8	
H. T. dual, percentage	50	33	20	30	30	65	44	47
H. T. double, percentage		67	30	47	30	20	48	47
Make-and-break, percentage				4.5				6
L. T. single				4.5	100	95	92	67
Carbureter—Gravity feed, percentage	100	67	100	60		5	8	33
Pressure feed, percentage		33		40	8	5		
Lubrication—Compression oiler, percentage					54	60	56	53
Circulating pump, percentage	100	100	80	71	8	15		
Gravity pump, percentage					15	10	28	47
Mechanical oiler, percentage			20	29	8	10	16	
Circulating, flywheel, percentage								
Gravity, flywheel, percentage								
Clutch—Mul. disk, percentage	50	67	30	58	61	40	52	33
Cone, percentage	50	33	30	31	15	45	40	53
Band internal, percentage			20	4.5	8	5	4	7
Band external, percentage			20	6.7				7
None, percentage					15	10	4	
Transmission—Selective 2, percentage					23			
Selective 3, percentage	50	67	80	49	8	60	96	53
Selective 4, percentage			10	47		5		47
Progressive 1, percentage								
Progressive 2, percentage					8			
Progressive 3, percentage			10	4	8	5		
Planetary 2, percentage	50	33			38	10		
Planetary 3, percentage						10		
Friction, percentage					15	10	4	
Drive—Shaft, percentage	100	100	100	91	62	75	92	100
Chains, percentage				9	38	25	8	

Late News From New York Shows

NEW YORK, Jan. 4—Special telegram—The usual round of entertainment which invariably accompanies the opening of the show circuit in this city has just begun, although an introduction was offered New Year's night in the smoker of the Automobile Club of America. Last night witnessed the banquet of the Society of Automobile Engineers at the same club. Tonight the annual banquet of the Motor and Accessory Manufacturers took place at the Waldorf following the annual meeting of this organization.

On Thursday a meeting in the interest of good roads will be held at the A. A. A. headquarters and the same day there will be a meeting of the management committee of the A. M. C. M. A. In the evening the annual dinner given by the Maxwell company will be held at the Manhattan.

Up to tonight the attendance at the show has exceeded the expectation of the most sanguine, the daily attendance being much higher than that on similar days of previous years. The out-of-town agents are arriving in droves every day and already close to 800 of them have signed the registers. A goodly number are present from Canada, two or three have registered from Mexico, and there is a good representation from the western states. The question of sales does not engross the attention as it did in former years, there being none of those fly-by-night stories of selling a hundred cars a day.

Engineers Talk Shop

Yesterday's meeting of the Society of Automobile Engineers, held at the Automobile Club of America, consisted in reading two papers and a discussion of them, together with a dinner this evening at the club house, which seventy-five of the engineers attended.

Hugh Rodman read a brief paper on the effect of frequent and heavy charging upon pasted lead peroxide plates, bringing out the fact that these plates, which are not abused often, fail by softening of the active material, which silts from the face of the plates into the bottom of the cell. There are three reasons for this: First, there is the untangling of the set crystalline mass, due to the cycle of change from peroxide to sulphate and back to peroxide to which a portion of the active material is subjected with each charge and discharge. Second comes the solution of the set crystalline lead compounds and the precipitation of them as loose purvelent compounds. This follows from the formation of concentrated sulphuric acid in the pores of the plates during charge, this dense acid dissolving the lead sulphate and reprecipitating it upon contact with the diluted acid at the surface of the plates. Third is the solution of crystalline lead compounds and reprecipitation as noncrystalline compounds due to the formation of persulphuric acid at the surface of the plates during the gassing period.

The first trouble may be helped by less frequent charging and starting with a set of more thoroughly crystallized plates. The solution of lead compounds by dense sulphuric acid may be partially overcome by the use of thin and porous rather than thick and dense plates, thus giving the sulphuric acid formed during the charge a chance to mix more easily with the dilute free acid outside of the plates. Slow charging will give the same results. Disintegration due to persulphuric acid may be lessened by infrequent complete gassing charges. The gassing charge must be given occasionally, but once in 2 weeks is often enough. It is harmful to gas plates freely at the end of each charge. The best scheme of charging suggested by theory is to charge at a moderate rate, to recharge only after partial discharges, and to only occasionally give the gassing charge. The life of a battery is increased by moderate charging, say the 4-hour rate to begin with, and half this rate at the end of the charge.

Longer service is secured by infrequent charging. Fairly complete charges up to 2.4 volts per cell with the current equal to about half the 4-hour rate of discharge gives longer life to plates than where the gassing period is a part of each charge.

At the end of the session the engineers adjourned to the dynamo-meter testing plant to witness a couple of special horsepower tests. The rumor is afloat that the club wishes to dispose of this testing apparatus as it was with a view of the engineers looking more closely into the desirability of the device that today's tests were made.

Tell of Foreign Situation

Back from a motoring trip in Europe and at present at the show are Captain William Mitchell Lewis, president and general manager of the Mitchell Motor Car Co., of Racine, and G. Vernon Rogers, its secretary, who traversed a little more than 2,000 miles of diversified roads, ranging from the broad highways of England to the mountain roads of the Pyrennes and the mediocre roads of Spain in the Mitchell six cylinder, at the wheel of which sat Rene Petard, European representative of the Mitchell company, whose headquarters are in the Rue de Tilsit, Paris.

"The American-made cars are enjoying a wonderful amount of popularity in continental Europe and in the British Isles," says Captain Lewis. "While in London we visited the Olympia show, the largest and best motor exposition ever held. The success of this show has taught the continental makers, especially the French and German manufacturers, their great mistake in not holding the usual big annual expositions that have served to direct the attention of the world to their wares. As a result of the lesson given to them, the French makers are even now planning for a huge Paris salon in November or December, 1910, to offset the depressing effect of the failure to hold the salon this year. Germany also is figuring on a great show revival, while the French makers who now realize the lack of wisdom in abolishing great track and road race classics, are planning a race revival upon one of their three big courses during 1910.

"I was impressed by economic problems presented by the European situation. The continent has not the motor-purchasing public that the United States has, although in France the national records show that the wealth per capita is more evenly distributed than in any other country abroad. In England there are many poor and also many rich. But the great class that might be depended upon to absorb motor cars is that element which the Briton refers to as 'in trade.' The tradesmen are perfectly able to purchase cars, but they refrain from doing so rather than have it appear they are aping royalty and aristocracy. The contrast in America is rather marked to the traveler—imagine the business man of the United States going without a motor car if he wished one—and he has the money to buy the car. He might not hesitate a moment to deliver a spool of thread to a particularly good customer, using a motor car to make the delivery.

"You are struck abroad and especially in London by the number of taxicabs and commercial vehicles. The field is a great one. Before I left there Gamage Limited of London was just negotiating a contract for putting 3,000 more taxicabs on the streets of Greater London, which has 3,000,000 more population than Greater New York and not nearly as many motor cars—and so important has the taxicab problem become that they are starting schools for the education of cabmen's children for the avocation of the chauffeur."

It is talked around the show that in the state legislature next month a reconstruction of the New York motor-vehicle law, designed particularly to regulate the driving of motor cars in the streets of the cities and villages and the highways of the towns, will be among the important objects to be considered. It is known that Governor Hughes is deeply interested and will, do doubt, discuss the matter again in his annual message. The secretary of state who now has control of the issuance of motor car licenses, Police Commissioner Baker of New York, the National Highway Protective Society and others are now at work receiving suggestions relative to proposed legislation. The National Highway Protective Society has suggested the appointment of a commission for the issuing and revoking of licenses for chauffeurs and the regulation of conditions that will tend to reduce reckless driving of cars.

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What Will the End Be?

THE present year has been a momentous one in the history of the A. L. A. M. in view of the recent court decision in which the validity of the Selden patent was sustained in the circuit court. Up to that juncture, motoring history in America was chiefly one concerned with the progress of rival organizations: the license group on one hand, and the independents, as they were termed by many, on the opposite side. Up to the very moment of the court decision it was an even chance as to whether the courts of the land would sustain the licensed or unlicensed parties, and when the decision was announced that the Selden patent had been sustained, it marked a most memorable mile stone, so far as the history of motoring in America is concerned.

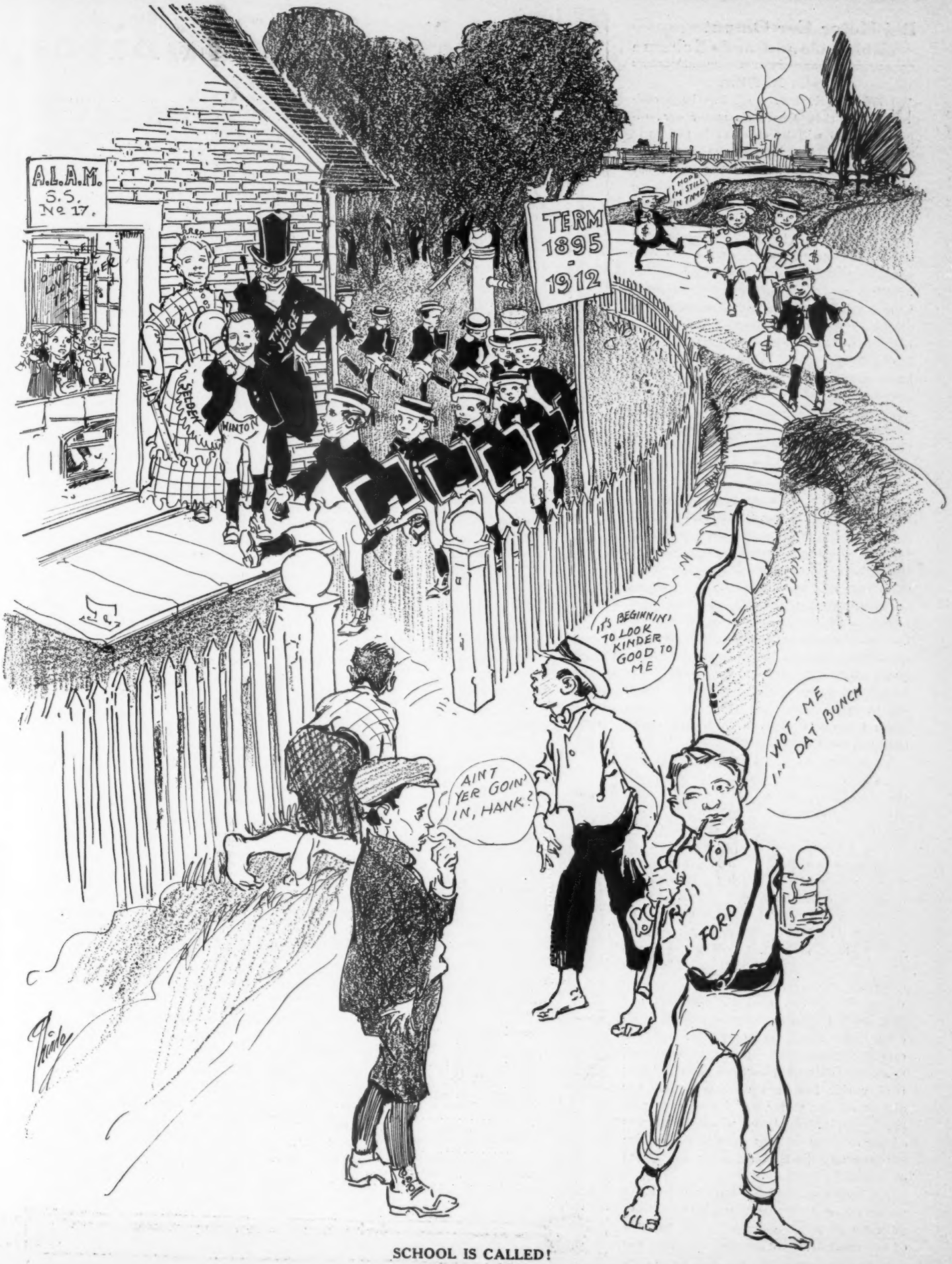
UP to this court decision, the Selden ranks had rarely exceeded the thirty-five mark, and from year to year this number has been nearly constant. Since that memorable decision, the A. L. A. M. party has been increased practically 50 per cent and the best blood of the opposition ranks has allied itself with the makers who have for years constituted the licensed party. In the few short months since the decision was made, money has been pouring in to the coffers of the Seldenites. One concern paid in to the extent of $450,000, and it is understood that a couple other concerns have had to pay in $80,000 each. From these three concerns alone there is a treasury fund of over a half-million dollars, and if it were only known what the other fifteen or sixteen independents who have switched their allegiance during the past few months have paid, it would be amazing to see the prosperous condition of the A. L. A. M.

PRESENT gossip has it, and it is most natural that a portion of this revenue will be divided pro rata, according to status, among the original group of Seldenites who have been paying their license for several seasons. It is to be hoped that all of this revenue will not go to the melon fund, and that the A. L. A. M. will not become simply a tribute strong box. On the other hand, the industry in America is in need of assistance, and there is no more opportune time than at the present moment, and with the present revenue on hand for the original Seldenites, reinforced by the leaders of the Independents, to establish some institution that would be a permanent memorial to motoring in America.

MANY of our factories have not, up to the present time, devoted that energy to research that the motor car of this country demands. It is true that some of our leading universities have set apart special departments in which research work in conjunction with motor cars is carried on, but in this the manufacturers have no part other than in that they have the privilege of paying for tests of whatever nature they desire conducted. This would be an excellent opportunity for the motorists to endow a department to be devoted to research work, solely, for the present at least, in conjunction with the motor cars. It is an acknowledged fact that the gasoline motor at present is in its early days of evolution, and these are the days when research is needed so that America can take its place and become, as it should, the leader in the development of this, the marvelous power generator of the present century.

IT is to be hoped now, that at least the leaders of the rival organizations have been amalgamated by the court decision into one, that there will be more unity of action among the different manufacturers of the country. Up to the present it has been a factional fight, the Seldenites arranged on the one hand and the Independents on the other. It is a fact that at times the energies of these respective parties, which have been to an extent occupied with party controversy, could much better have been employed to the demands of the general activities of motoring, and so have worked a common good to both parties. Now that this barrier is broken the different members in the new Selden fold should act with concerted vigor and forget little trade jealousies that have been so important in the minds of some. The big industry demands big-hearted action, and if there was ever a time when the strongest united action of an industry was required, it is today. There is a big field for the undivided activities of this recently rehabilitated licensed organization. Up to the present time many of the manufacturers have held aloof from problems which are of vital interest to the industry, and they have been left to the motoring organizations, composed largely of individual car owners and clubs scattered throughout the length and breadth of the country. It is only in the last year that these manufacturers have realized that good roads sell cars and that now it is imperative to develop good road movement in states where the virgin trails are labeled highways. The output of cars in certain states can be doubled and trebled if the good road movement is pushed and reap directly as a result of this, and they should be willing to help it along by moral and financial aid. Federal legislation is a point of utmost importance to makers and will prove of increasing importance during the next few years because of higher license fees and increased road taxes, which may be imposed on cars. In order that the motor car may bear its proper proportion of this there must be united action of the makers and the many different clubs and affiliated organizations throughout the country, and with this action much can be obtained which the industry requires at the present time.

REFERRING again to the subject of good roads, it must be admitted that the American Automobile Association has waged a vigorous campaign for improved highways throughout the country and in this it has been given vigorous support by various farmers' organizations which are showing just as lively an interest in the proposition as the national motoring organization. Like the motorist the farmer realizes that good roads are a necessity, that if modern arteries enable him to carry his product to market with comparatively little trouble that he will not only save time but money as well, for with good roads comes prosperity. It would seem that the manufacturers, allied together in the manner in which they are, might extend financial aid to worthy organizations which are working for the cause and which would appreciate such help. True, the Selden association has, like the American Motor Car Manufacturers' Association, assisted heretofore in matters of this kind, but the proposition now has become one of such magnitude that the workers can stand the golden shower and could use it to good advantage. Another subject which also is worthy of consideration is the signboard proposition which has been taken up by clubs in different parts of the country and which already have accomplished much good in this direction.



SCHOOL IS CALLED!

Big Motor Car Output Helps Good Roads Scheme

By F. H. Elliott

NEW YORK, Jan. 3—It has been estimated that America's motor car output for 1910 will be close to if not fully 200,000 cars. A reflection of this truth is already being shown in the elaborate preparations and the large number of exhibitors for the two great annual and national shows in New York city. Close observers of the business interests that make possible an output of 200,000 cars see the truth of this statement in the bustling activities everywhere apparent among makers of cars and accessories. In scores of cases the product of 1909 is being increased for the coming year from 25 to 50 per cent. New factories have been built, others enlarged, great combinations for economy and improvements have been effected, and the great series of shows which, beginning in New York, will be continued for the next 4 months or so in all parts of the country, promise to be the most successful both from the manufacturers' point of view and that of the public ever held in the United States.

This enormous output of new cars demonstrates at the outset two things: first, the stability of the manufacturers and the excellence of their product, and, second, the increasing popularity of the motor vehicle. And it is because of this latter fact that the ever widening influence of the motor car upon the economic and even the political welfare of the country deserves to be carefully noted. In other words, what effect for good or ill will these thousands of new cars exert upon the national life and conditions?

To properly answer this question it will be well to make a brief survey of the motor influence within recent years. Of prime importance comes the zest for touring, then a growing appreciation for good roads. An extensive touring means traveling from one state to another, there naturally arises the demand for reasonable municipal ordinances and uniform state legislation to protect the rights not only of the motorists but other users of the highway. Allied with these arises the necessity for proper signboards marking the distances from place to place, as well as dangerous curves, railroad crossings and hills, and, further, proper maps and route cards. In all these the motor car has scored victories, not always accomplished without battling against prejudice, but how readily this has been disarmed when the ability of the motor car for various uses has been discovered and when the owners of machines have been careful to exercise courtesy and discrimination for the rights of others.

No longer does the farmer menace the motor car as in former days. The farmer in many parts of the country is now one of the most ardent advocates of motor car use, and no longer decries the movement

List of Exhibitors

MAIN FLOOR

Elmore Mfg. Co.....Clyde, O.
Everitt-Metzger-Flanders Co.....Detroit, Mich.
Studebaker Automobile Co.....South Bend, Ind.
F. B. Stearns Co.....Cleveland, O.
Knox Automobile Co....Springfield, Mass.
Columbia Motor Car Co...Hartford, Conn.
Autocar Co.....Ardmore, Pa.
Corbin Motor Vehicle Corp.....New Britain, Conn.
Matheson Motor Car Co..Wilkesbarre, Pa.
Pope Mfg. Co.....Hartford, Conn.
Lozier Motor Co.....New York.
Locomobile Co. of America.....Bridgeport, Conn.
American Locomotive Co.....Providence, R. I.
Packard Motor Car Co.....Detroit, Mich.
Pierce-Arrow Motor Car Co.....Buffalo, N. Y.
Cadillac Motor Car Co.....Detroit, Mich.
Chalmers-Detroit Motor Co.....Detroit, Mich.
E. R. Thomas Motor Co....Buffalo, N. Y.
H. H. Franklin Mfg. Co...Syracuse, N. Y.
Winton Motor Carriage Co...Cleveland, O.
Stevens-Duryea Co..Chicopee Falls, Mass.
Peerless Motor Car Co. ....Cleveland, O.
Buick Motor Co.....Flint, Mich.

ELEVATED PLATFORM

Selden Motor Vehicle Co.....Rochester, N. Y.
Willys-Overland Co.....Toledo, O.
Hewitt Motor Co.....New York.
Royal Tourist Car Co .....Cleveland, O.
Mercer Auto Co.....Trenton, N. J.
Olds Motor Works.....Lansing, Mich.
Haynes Automobile Co.....Kokomo, Ind.
Waltham Mfg. Co.....Waltham, Mass.
Hudson Motor Car Co.....Detroit, Mich.
Apperson Bros. Automobile Co.....Kokomo, Ind.

EXHIBITION HALL, MADISON SQUARE FRONT

Woods Motor Vehicle Co..... Chicago.
S. R. Bailey & Co., Inc...Amesburg, Mass.
The Waverley Co.....Indianapolis, Ind.
Babcock Electric Carriage Co.....Buffalo, N. Y.
Columbia Motor Car Co...Hartford, Conn.
Baker Motor Vehicle Co.....Cleveland, O.
Anderson Carriage Co.....Detroit, Mich.
Rauch & Lang Carriage Co..Cleveland, O.
Studebaker Automobile Co.....South Bend, Ind.

COMMERCIAL VEHICLE DEPARTM'T

Knox Automobile Co....Springfield, Mass.
E. R. Thomas Motor Co.....Buffalo, N. Y.
Studebaker Automobile Co.....South Bend, Ind.
Baker Motor Vehicle Co....Cleveland, O.
H. H. Franklin Mfg. Co...Syracuse, N. Y.
American Locomotive Co.....Bridgeport, Conn.
Autocar Co.....Ardmore, Pa.
General Vehicle Co.....New York.
Packard Motor Car Co.....Detroit, Mich.
Pope Mfg. Co.....Hartford, Conn.
Alden Samson Mfg. Co...Pittsfield, Mass.
Hewitt Motor Co.....New York.

ELEVATED PLATFORM ACCESSORIES

B. F. Goodrich Co.....Akron, O.
Diamond Rubber Co.....Akron, O.
C. F. Splitdorf.....New York
Goodyear Tire and Rubber Co.....Akron, O.
Atwater Kent Mfg. Works.....Philadelphia, Pa.
G. & J. Tire Co.....Indianapolis, Ind.
Gray & Davis.....Amesbury, Mass.
Pennsylvania Rubber Co....Jeanette, Pa.
R. E. Dietz Co.....New York.
Cramp & Sons Co.....Philadelphia, Pa.
Baldwin Chain and Mfg. Co.....Worcester, Mass.
Phineas Jones & Co.....Newark, N. J.
Light Mfg. and Foundry Co.....Pottstown, Pa.
Jones Speedometer.....New York.
Conn. Telephone and Elec. Co. .....Meriden, Conn.
C. A. Mezger.....New York.
Weed Chain Tire Grip Co.....New York.
N. Y. and N. J. Lubricant Co..New York.
Republic Rubber Co.....Youngstown, O.
National Carbon Co.....Cleveland, O.
Ajax-Grieb Rubber Co.....Trenton, N. J.
Hartford Suspension Co..Jersey City, N. J.
Empire Tire Co.....Trenton, N. J.
R. E. Hardy Co.....New York.
Janney Steinmetz & Co.....Philadelphia, Pa.
J. H. Sager Co.....Rochester, N. Y.
American Ever Ready Co.....New York.
Auto Improvement Co.....New York.
Witherbee Igniter Co....Springfield, Mass.
Globe Mach. and Stamping Co.....Cleveland, O.
Leather Tire Goods Co.....Niagara Falls, N. Y.
Coes Wrench Co.....Worcester, Mass.
Cooks Standard Tool Co.....Kalamazoo, Mich.
Hoffecker Co.....Boston, Mass.
The Edmunds & Jones Mfg. Co. ....Detroit, Mich.
Fox Metallic Tire Belt Co.....Brooklyn, N. Y.
C. Cowles & Co.....New Haven, Conn.
Continental Rubber Works.....Erie, Pa.
Motz Clincher Tire and Rubber Co....Akron, O.
Duff Mfg. Co.....Pittsburg. Pa.
A. W. Harris Oil Co....Providence, R. I.
Firestone Tire and Rubber Co.....Akron, O.
Oliver Mfg. Co.....Chicago, Ill.
Timken-Detroit Axle Co....Detroit, Mich.
Timken Roller Bearing Co. ...Canton, O.
Warner Instrument Co.....Beloit, Wis.
Motsinger Device Mfg. Co.....Pendelton, Ind.
Randall-Faichney Co.....Boston, Mass.
Byrne-Kingston & Co.....Kokomo, Ind.
Spicer Universal Joint Mfg. Co.....Plainfield, N. J.
Pittsfield Spark Coil Co....Dalton, Mass.
Whitney Mfg. Co.....Hartford, Conn.
Brown-Lipe Gear Co.....Syracuse, N. Y.
Swinehart Clincher Tire and Rubber Co.....Akron, O.
Warner Gear Co.....Muncie, Ind.
American Ball Bearing Co...Cleveland, O.
Standard Welding Co.....Cleveland, O.
Badger Brass Mfg. Co.....Kenosha, Wis.
A. R. Mosler.....New York.
Gabriel Horn Mfg. Co.....Cleveland, O.
Joseph Dixon Crucible Co.....Jersey City, N. J.
Heinze Electric Co.....Lowell, Mass.
C. T. Ham Mfg. Co.....Rochester, N. Y.
Valentine & Co.....New York
Adams Cooks Sons.....New York
Briscoe Mfg. Co.....Detroit, Mich.
Gilbert Mfg. Co.....New Haven, Conn.
Vacuum Oil Co.....New York
Atwood Castle Co.....Amesbury, Mass.
Herz & Co.....New York
S. F. Bowser & Co.....Ft. Wayne, Ind.
Springfield Metal Body Co.....Springfield, Mass.
Michelin Tire Co.....Milton, N. J.
Remy Electric Co.....Anderson, Ind.
Consolidated Rubber Tire Co...New York
Stewart & Clark Mfg. Co.....Chicago
Wheeler & Schebler....Indianapolis, Ind.
Continental Caoutchou Co.....New York
The Fisk Rubber Co.....Chicopee Falls, Mass.
Veeder Mfg. Co.....Hartford, Conn.
Morgan & Wright.....Detroit, Mich.
Diamond Chain & Mfg. Co.....Indianapolis, Ind.
The Hartford Rubber Works.....Hartford, Conn.

BALCONY

Elec. Storage Battery Co.....Philadelphia, Pa.
C. A. Shaler.....Waupum, Wis.
Link-Belt Co.....Indianapolis, Ind.
High Wheel Auto Parts.....Muncie, Ind.
Noera Mfg. Co.....,Waterbury, Conn.
Havoline Oil Co.....New York
Warner Mfg. Co.....Toledo, O.
Batavia Rubber Co.....Batavia, N. Y.
Driggs-Seabury Ordnance Corp.....Sharon, Pa.
Charles E. Miller.....New York
Sireno Co.....New York
Champion Ignition Co.....Flint, Mich.
Keystone Lubricating Co.....Philadelphia, Pa.

at the A·L·A·M Show

Perfection Wrench Co.....Port Chester, N. Y.
R. I. V. Co.....New York
Jeffrey-Dewitt Co.....Newark, N. J.
Thomas Presser & Sons.....New York
Eastern Carbon Works.....Jersey City, N. J.
Simms Magneto Co.....New York
Isaac C. Johnson & Co.....Spuyten Duyvil, N. Y.
L. J. Mutty Co.....Boston, Mass.
H. H. Franklin Mfg. Co...Syracuse, N. Y.
High Frequency Ignition Co.....Los Angeles, Calif.
S. Hoffnung & Co., Ltd.....New York
Peter A. Frasse & Co.....New York
Lavalette & Co.....New York
J. S. Bretz Co.....New York
George A. Haws.....New York
K. W. Ignition Co.....Cleveland, O.
Morrison Ricker Mfg. Co.....Grinnell, Ia.
N. Y. Sporting Goods Co.....New York
Carpenter Steel Co.....Reading, Pa.
Pierson Motor Supply Co.....New York
Ernest Flentje.....Cambridge, Mass.
Allen Auto Specialty Co.....New York
Geizler Bros. Storage Battery Co.....New York
Standard Leather Washer Mfg. Co.....Newark, N. J.
William P. Miller's Sons.....Long Island City, N. Y.
McGraw Tire and Rubber Co...New York
H. W. Jones-Manville Co.....New York

BALCONY EXTENSION, MADISON AV.

Emil Grossman Co.....New York
McCue Co.....Hartford, Conn.
Stein Double Cushion Tire Co...Akron, O.
Plate Battery Co.....Binghamton, N. Y.
Elite Mfg. Co.....Ashland, O.
Riley-Klotz Mfg. Co.....Newark, N. J.
Hopewell Bros.....Cambridge, Mass.
Motor Car Equipment Co.....New York
Novelty Mfg. Co.....Waterbury, Conn.
Automatic Headlight Co.....New York
Burn-Boston Battery and Mfg. Co.....Boston, Mass.
Frank H. Cross.....New York
N. J. Car Spring and Rubber Co.....Jersey City, N. J.
American Vanadium Co....Pittsburg, Pa.

BALCONY EXTENSION, FOURTH AV.

Bosch Magneto Co.....New York
Stackpole Battery Co....Roxbury, Mass.
Metal Stamping Co.....New York
Vanadium Metals Co....Pittsburg, N. Y.
Zeglen Bullet Proof Cloth Co.....Chicago
Howard Demountable Rim Co.....Trenton, N. J.
Cox Brass Mfg. Co.....Albany, N. Y.
Philip C. Traver Mfg. Co.....Far Rockaway, L. I.
Lavigue Mfg. Co.....Detroit, Mich.
Barnard Specialty Co....Los Angeles Cal.
Stevens & Co.....New York
Livingston Radiator and Mfg. Co. Inc.....New York
P. Reilly & Son.....Newark, N. J.
Perfection Spring Co.....Cleveland, O.
Detroit Motor Car Supply Co.....
Wayne Oil Tank & Pump Co.....Fort Wayne, Ind.

CONCERT HALL

Sprague Umbrella Co.....Norwalk, O.
L. C. Chase Co.....Boston, Mass.
Victor Auto Supply Mfg. Co...New York
Columbia Lubricants Co of N. Y.....New York
A. O. Smith Co.....Milwaukee, Wis.
Thermoid Rubber Co.....Trenton, N. J.
Standard Roller Bearing Co.....Philadelphia, Pa.
Stromberg Motor Devices Co.....Chicago
U. S. Light and Heating Co.....New York
Pantasote Co.....New York
Federal Rubber Co.....Milwaukee, Wis.
Hayes Mfg. Co.....Detroit, Mich.
Vesta Accumulator Co.....Chicago
National Coil Co.....Lansing, Mich.
Dayton Rubber Mfg. Co.....Dayton, O.
Hancock Mfg. Co.....Charlotte, Mich.
The Seamless Rubber Co.....New Haven, Conn.
C. M. Hall Lamp Co.....Detroit, Mich.
Royal Equipment Co....Bridgeport, Conn.
McCord Mfg. Co.....Detroit, Mich.
Lebanon Steel Casting Co...Lebanon, Pa.
Briggs & Stratton.....Petersburg, Va.
Lovell-McConnell Mfg. Co..Newark, N. J.
Rands Mfg. Co.....Detroit, Mich.
Excelsior Motor & Mfg. Co.....Chicago
Gemmer Mfg. Co.....Detroit, Mich.
Hess-Bright Mfg. Co....Philadelphia, Pa.

SECOND TIER

Newark Rivet Works.....Newark, N. J.
Wright Wrench Mfg. Co.....Canton, O.
C. A. Willey Co.....Long Island, N. Y.
Kamlee Co.....Milwaukee, Wis.
Hilton Mfg. Co.....Boston, Mass.
Dover Stamping and Mfg. Co.....Cambridge, Mass.
Grum-Plant Construction Co.....Pittsburg, Pa.
Calmon Asbestos and Rubber Works.....New York
Shipman Instrument Co.....Sunbury, Pa.
Woven Steel Hose & Rubber Co.....Trenton, N. J.
Union Battery Co.....Bellville, N. Y.
Waterhouse Co.....Boston, Mass.
Motor Parts Co.....Plainfield, N. J.
Harry A. Allers Co.....New York
Columbia Nut & Bolt Co.....Bridgeport, Conn.
Recometre Co. of America.....Chicago

ROOM 7

Rothstein Mfg. Co.....New York
B. M. Asch.....New York
William R. Winn.....New York
New York Coil Co.....New York
Vorhees Rubber Mfg. Co.....Jersey City, N. J.
Gasoline Motor Efficiency Co.....Jersey City, N. J.
Favary Tire and Cushion Co.....East Boston, Mass.
Chandler Co.....Springfield, Mass.
Rushmore Dynamo Works.....Plainfield, N. J.
English & Merseck Co.....New Haven, Conn.
E. M. Benford.....Mount Vernon, N. Y.

BASEMENT, ACCESSORIES

Merchant & Evans.....Philadelphia, Pa.
James L. Gibney & Bro.....Philadelphia, Pa.
W. E. Pruden Hardware Co.....New York
Como Electric Co.....Spring Lake, N. Y.
H. & F. Mesinger Mfg. Co.....New York
Valvoline Oil Co.....New York
Nathan Novelty Mfg. Co.....New York
A-Z Co.....New York
Julius King Optical Co.....New York
International Engineering Co...New York
Joseph Tracy.....New York
Burroughs Remountable Rim Co.....New York
Apple Electric Co.....Dayton, O.
Nonpariel Horn Mfg. Co.....New York
Erie Foundry Co.....Erie, Pa.
Livingston Radiator Co.....New York
New Departure Mfg. Co....Bristol, Conn.
White & Bagley Co.....Worcester, Mass.
Vanguard Mfg. Co.....Joliet, Ill.
Ajax Trunk & Sample Case Co.....New York
Kilgore Mfg. Co.....Boston, Mass.
Post & Lester Co.....Hartford, Conn.
Nightingale Whistle Mfg. Co....New York
A. S. Noonan Tool & Mach. Works.....Rome, N. Y.
Willard Storage Battery Co.....Cleveland, O.
Phila. Storage Battery Co.....Philadelphia, Pa.
National Auto Top Co.....New York
Troy Carriage Sunshade Co.....Troy, O.

BASEMENT, MOTORCYCLE DEPT.

Merkel Light Motor Co....Pottstown, Pa.
Consolidated Mfg. Co.....Toledo, O.
N. S. U. Motor Co.....New York
American Motor Co.....Boston, Mass.
Hendee Mfg. Co.....Springfield, Mass.
Herring-Curtiss Co..Hammondsport, N. Y.
Harley-Davidson Motor Co.....Milwaukee, Wis.
Reading-Standard Co.....Reading, Pa.
Aurora Automatic Machinery Co..Chicago
Greyhound Motor Works...Buffalo, N. Y.
Pierce Cycle Co.....Buffalo, N. Y.
Excelsior Supply Co.....Chicago
New Era Gas Engine Co.....Dayton, O.
Eclipse Machine Co.....Elmira, N. Y.
F. A. Baker & Co.....New York
Royal Motor Works, Inc.....Worcester, Mass.
Miami Cycle & Mfg. Co...Middletown, O.
Emblem Mfg. Co.....Angola, N. Y.
Narvol Motorcycle Co.....Hammondsport, N. Y.
Reliance Motorcycle Co.....Owego, N. Y.
S. D. Mfg. Co.....Brooklyn, N. Y.

Secretary Elliott of A. A. A. Tells of Progress Made

for good roads. Indeed the national grange and farmers' clubs are now the strongest allies of motorists towards securing beneficial measures.

Still another point, and perhaps the most prominent of all that has been accomplished year by year by the steadily increasing demand for more cars, thereby meaning new owners, new users and a wider distribution of service every season, is the organizing strength that has developed. The governing body of the United States, the American Automobile Association, depends upon the users of the country for the ability to secure these very benefits as have been enumerated. This national organization is the representative of the motorists of the country through their hundreds of clubs. Again, it is the representative of the states through the organization of these clubs into their respective state bodies.

That this national idea is being well worked is amply shown by the fact that the national association showed an increase of approximately 50 percent in membership during the past year, its present membership being close to 26,000. There are thirty state associations, including those of Hawaii and the District of Columbia. These associations have a membership of about 225 clubs, and there is in addition a score of unfederated clubs in states where state associations have not as yet been formed. Six new associations were formed during the year; in the states of Louisiana, Colorado, Utah, South Dakota, Wyoming and Iowa. Texas and Alabama are about to form state associations. In no part of the country has there been more active interest in the practical work accomplished through the agencies of motoring than in the South. The good roads movement has been agitated there as never before.

The American Automobile Association has space at both of the shows in New York. Representatives of the association are in attendance and members are invited to make use of the booth where a telephone will be provided and everything possible arranged for their comfort.

During the week of the show at Grand Central Palace the first meeting of the good roads board for 1910 will be held at national headquarters, 437 Fifth avenue, on Thursday, January 6, at 10 o'clock in the forenoon, Chairman George C. Diehl, presiding.

A. A. A. members holding certificates for reduced railroad rates should present the same for validation promptly. The representative of the Trunk Line Association will be in attendance from 9 a. m. to 6 p. m. on January 4, 5, 6 and 7 at the Forty-third Street entrance of the Grand Central palace, and on January 11, 12, 13 and 14 at space 327, concert hall, Madison Square garden.

Kinks in Luggage Carrying

IN DEALING with the baggage-carrying facilities of their 1910 products, and at the same time endeavoring to bring about a more practical and harmonious distribution of equipment, the motor car manufacturers have been confronted with rather a serious problem. The touring motorist demands that ample provisions be made for the attachment or storage of a few extra articles of clothing and small personal effects which one carries along with him on a journey. It also is necessary that such articles as extra tires, batteries, tools, acetylene gas generators or tanks, extra oil, grease and carbide cans, side curtains and other accessories to the equipment of the car be specially provided for and conveniently placed. In order to satisfy this demand in almost all cases the tools and batteries have been removed from under the seats and placed in neat boxes on the running-boards; generators, tanks and tires also have been placed on or about the running-boards, and gasoline tanks have been removed from under the front seat and suspended from the frame at the rear, so that the compartments under both seats of many cars may now be used for the storage of waterproof robes and coats, oil and grease cans and side curtains, jumpers, inner tubes, and tools which are too large for the tool box, and for carrying excess baggage while touring extra baggage racks are now fitted to all cars either as extra or regular equipment, on which several suit cases may be packed, or to which specially-designed trunks are fitted, and held in place with leather straps.

A few years ago when this movement of making room for excess baggage was first begun, owing to short wheelbase, perhaps, and consequent short running-boards, the accessories were crowded upon the running-boards and about the sides of the car in a manner that made it resemble somewhat in appearance the suburbanite returning from a shopping expedition, with miscellaneous small packages protruding from his bulging coat pockets and a disturbed assortment of awkward parcels under his arms. In recent years, however, rapid strides have been made toward a more symmetrical and artistic arrangement of the regular equipment; this has been done without in any way encroaching upon the baggage-carrying facilities; and all parts are more conveniently reached, and with less disturbance of the passengers.

Battery boxes generally occupy a position opposite the front seats on the right side of the car and tool boxes are usually of the same size and shape and located in a similar position on the opposite side of the car. Tires are still carried in brackets at the right of the driver's seat in many cases, but there is a growing tendency toward removing them entirely from sight, or providing brackets for them on the back of the rear seat. Acetylene generators are in some cars attached to the side member of the frame at the right of the driver's seat, close in toward the frame, which is not a bad position; then, again, there are others which set upon the running-board, as on the Royal Tourist, shown in Fig. 1; and in a number of cases the generators are now attached direct to the projections of the body where they slant up to the dash. Acetylene tanks are fitted to many cars this year as regular equipment, and although there are but few cars with the tanks in the same location, the general tendency is to place them in as accessible an out-of-the-way place as possible, where they may be readily removed and replaced when exchanged, and where their gauges can be easily seen. On those cars on which the tank is attached to the running-board the brackets are so placed that the tank sets close in to the frame, and there are few, if any, cases where access to the seats is impaired by these tanks. In Fig. 2, which represents a section of the Winton six, the tank rests in brackets attached to the frame at the left of the dash. The double adjustment and the gauge, which are quite common on most acetylene outfits this year, is quite plainly portrayed in this sketch. A is the permanent adjustment, and B the service valve; after the valve A has once been set, so that the lights burn as desired, valve B only is used to turn on or shut off the gas, it being either opened wide or shut off entirely, and no adjustment is necessary. In the Winton cars the gasoline tank is attached to the frame at the rear, the compartment C, under the front seat in the illustration, is designed to receive two or three storage batteries, and D is a drawer for tools which is fitted with a Yale lock to prevent loss of tools when car is in public garage.

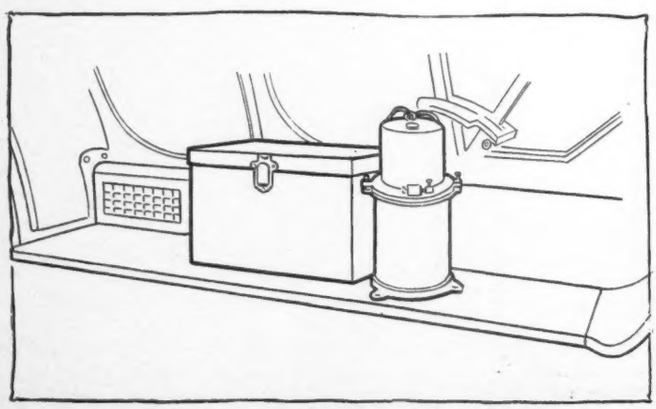


FIG. 1—RIGHT RUNNING-BOARD OF ROYAL TOURIST

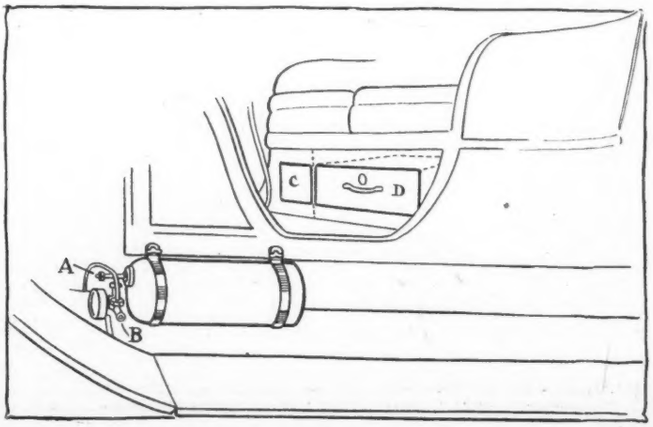


FIG. 2—ACETYLENE TANK LOCATION OF WINTON SIX

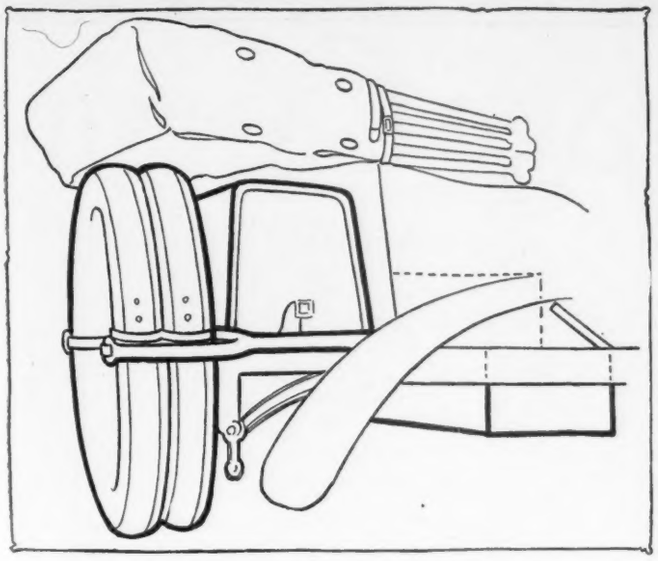


FIG. 3—LOCOMOBILE BAGGAGE CARRYING FACILITIES

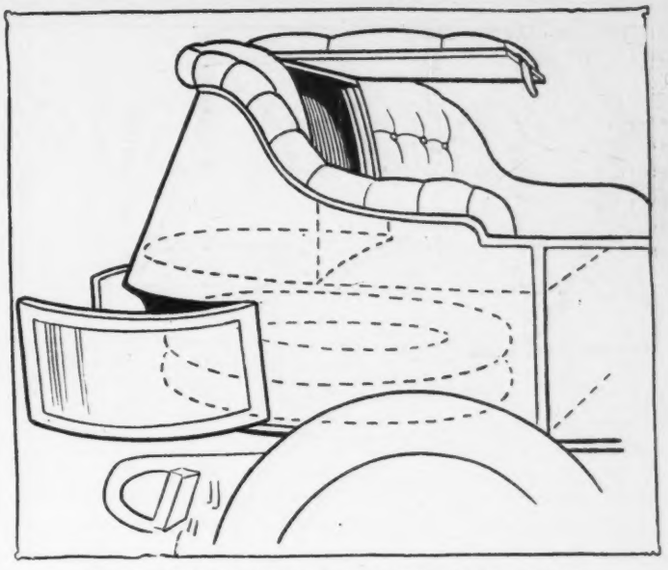


FIG. 4—LUGGAGE CAPACITY OF PALMER & SINGER CARS

Some of the baggage-carrying facilities of the Pierce Great Arrow are shown in Fig. 9; the rear end locker behind the axle, which has been a feature of the Pierce multi-cylinder cars since their origin, is still retained and in it are contained a large acetylene tank with a double adjustment and gauge as shown on the Winton, and the service valve prortudes through the side of the locker where it may be operated from the outside. In this locker an oil can and the hose which conducts the air from the tire pump on the engine to the tires is shown, and there is still plenty of space left for the jack, a tire repair kit and a couple of inner tubes. The trunk rack is also shown folded up against the back of the tonneau, and the dotted line outlines the compartment for baggage under the rear seat. The side curtains may be carried in a large leather pocket extending across the back of the front seats, shown in Fig. 13, and the large side pockets common on the doors of all tonneau cars also are shown.

The Thomas cars have a similar locker under the frame at the rear, as illustrated in Fig. 6. This space is partitioned off to form special compartments for the jack and tire pump, in which they fit snugly; and there is also room for inner tubes, a tire repair outfit and other miscellaneous articles. The door to this locker has special hinges which allow it to be slipped into place so that a lip on its upper edge fits into a corresponding depression in the body and renders the compartment water and dust proof. The compartments under the rear seats of these cars are greatly enlarged by extending the body back behind the rear seat; and the folding trunk rack is regular equipment.

There is hardly a car which provides neater or more capacious baggage-carrying facilities than the Columbia cars for 1910, as shown in Fig. 10. There is a large metal locker behind the rear axle which is designed to resemble a gasoline tank, a permanent trunk rack rests on the rear ends of the frame, and the regular compartment under the seat which contains a special tray for the side curtains. The doors on the open bodies are built without effect and upholstered with large leather expanding pockets, covered with leather flap which may be secured in place by a lock. Roadster bodies have a folding robe rail, and forged tire carriers fitted in sockets on the frame, removable without damage to the body.

For the real torpedo type of car, with its body lines uninterrupted by tire irons and casings, the Palmer & Singer torpedo has unusual baggage space, as may be seen from a glance at Fig. 4. The space under the seat will hold two casings, inner tubes, and many other articles; that behind the cushions of the rear seat may be used for curtains, robes, coats, etc., while the space under the front seats is adaptable for batteries, tools, etc. In Fig. 3 the baggage and tire-carrying capacity of the Locomobile toy tonneau cars is indicated. No small amount of luggage space is provided on these cars, as may be plainly seen. In addition to the regular space under the rear seat a special compartment of equal capacity hangs between the side members of the frame under the floor boards of the tonneau, a specially designed trunk and trunk rack and tire irons are fitted to the back end; and both tires and trunk are protected from the elements by water and dust proof coverings.

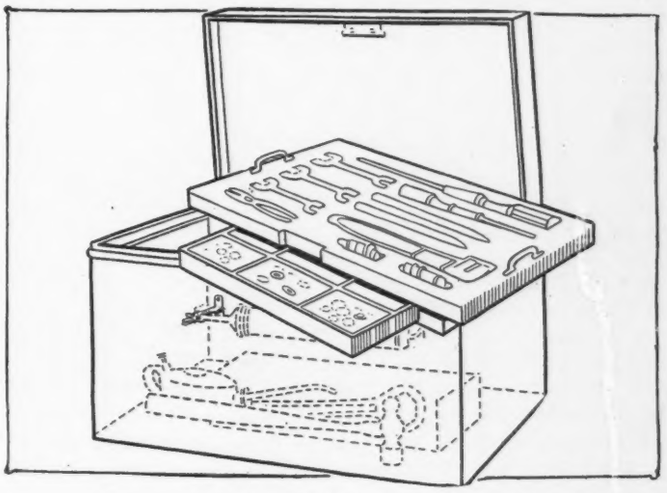


FIG. 5—WELL EQUIPPED TOOL BOX OF THOMAS CARS

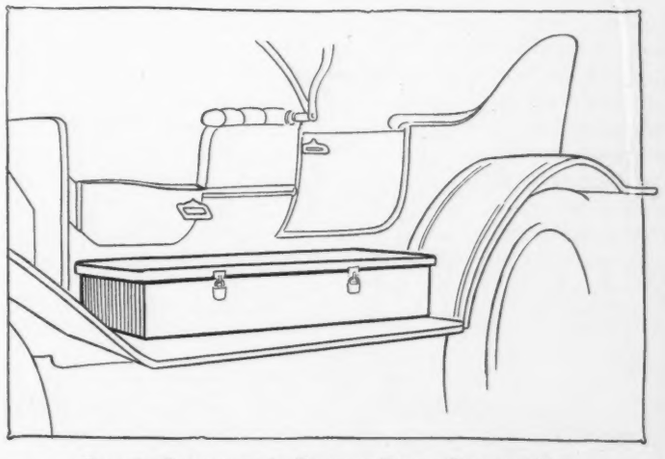


FIG. 6—OLDSMOBILE'S RUNNING-BOARD COMPARTMENT

From Fig. 6, which represents the left side of the Oldsmobile, it is plain that the subject of luggage space has been duly considered and very neatly worked out. In this construction the

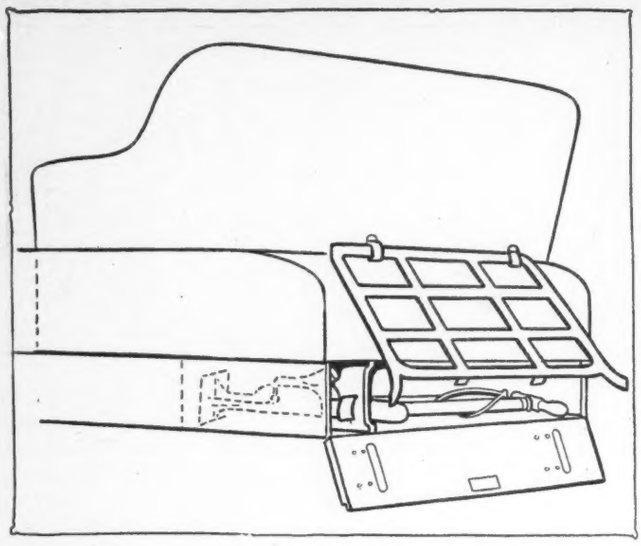


FIG. 7—REAR END COMPARTMENTS OF THOMAS CARS

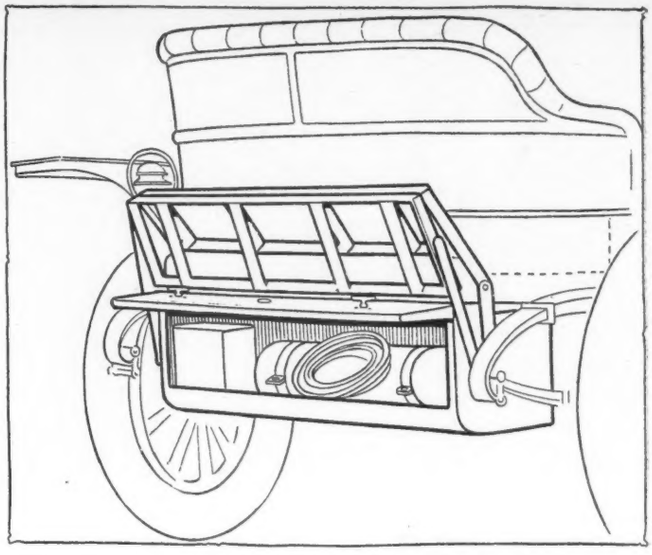


FIG. 9—PIERCE-ARROW'S REAR END CABINET

entire space between the running-boards and the frame is used to a very good advantage, the tops of the boxes serve as a second step and makes for easy access into the seats. In the box on the right running-board the tools and other essentials are carried, while the left side case is designed for the batteries and curtains. In addition to this the rear seat compartment, and a folding trunk rack are adaptable for touring baggage, there are side pockets in the doors and a three-cornered space is formed under the robe rail behind the front seats, which may be used for the safe keeping of gogglee and other small breakable articles. The acetylene tanks on these cars are suspended, as on several other cars of prominent make, from the rear end of the frame, which is not at all a bad place for them.

A more comfortably furnished tonneau than that of the Pope-Hartford model illustrated in Fig. 11 is hard to find, and aside from the large side pockets in the doors and the adjustable robe strap, there are two pockets near the floor, in back and below the front seats, which are intended for small personal effects, route-books and the like. The rear seat compartment is also reserved for extra baggage, and brackets are fitted at the rear of the tonneau which are designed for two tire casings.

Tool boxes are more elaborately equipped this year than ever before, and to prevent rattling, trays are provided which are made from a single block of wood which is recessed to the shape of the various tools. In Fig. 5, a detailed sketch of the Thomas tool box is shown. The top surface of the tray contains five end wrenches, ranging from ⅛ to ½ inches in size, a medium-sized monkey wrench, pliers, a file, two cold chisels, a large and a small screw driver, and two extra spark plugs; while in the drawer which slides into the lower portion of the tray a generous assortment of nuts and bolts, cotter pins, split washers, chain links, gaskets, wire, etc., is carried. Among the articles to be found under the tray in the lower portion of the tool box are an oil gun held in metal clasps, a compression hand-oiler, a special valve-lifting tool, a large hammer, a scale for measuring the depth of the gasoline in the tank, an instruction book, and a hub cap wrench; and there is still room for waste, extra oil and grease cans and other essentials generally useful while touring.

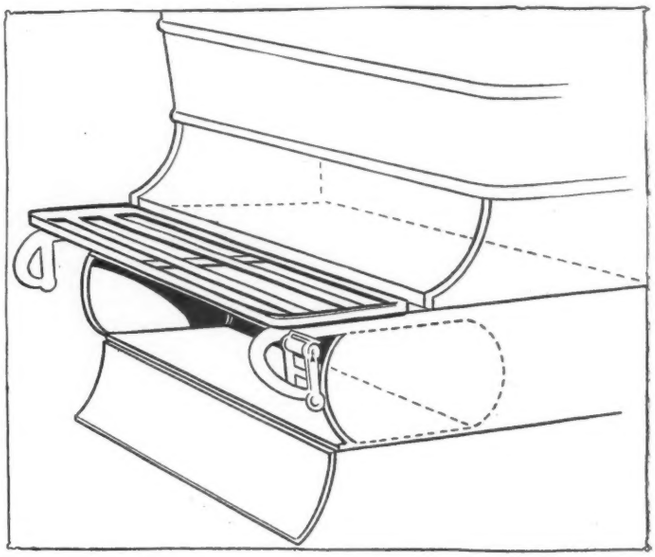


FIG. 10—CAPACIOUS LUGGAGE FACILITIES OF COLUMBIA

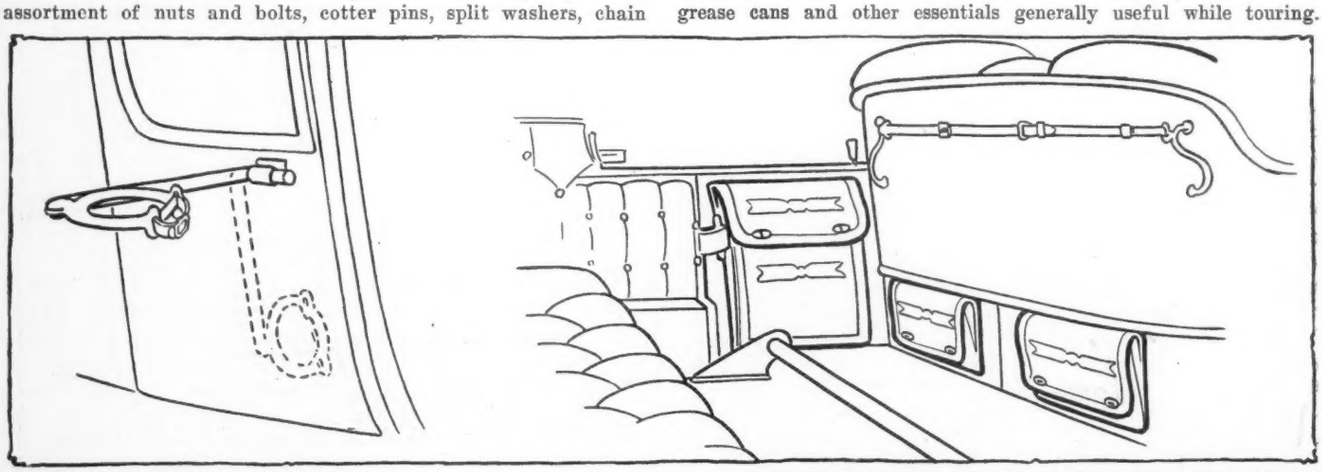


FIG. 8—PEERLESS FOLDING TIRE-IRON

FIG. 11—POPE-HARTFORD TAKES CARE OF THE LITTLE THINGS

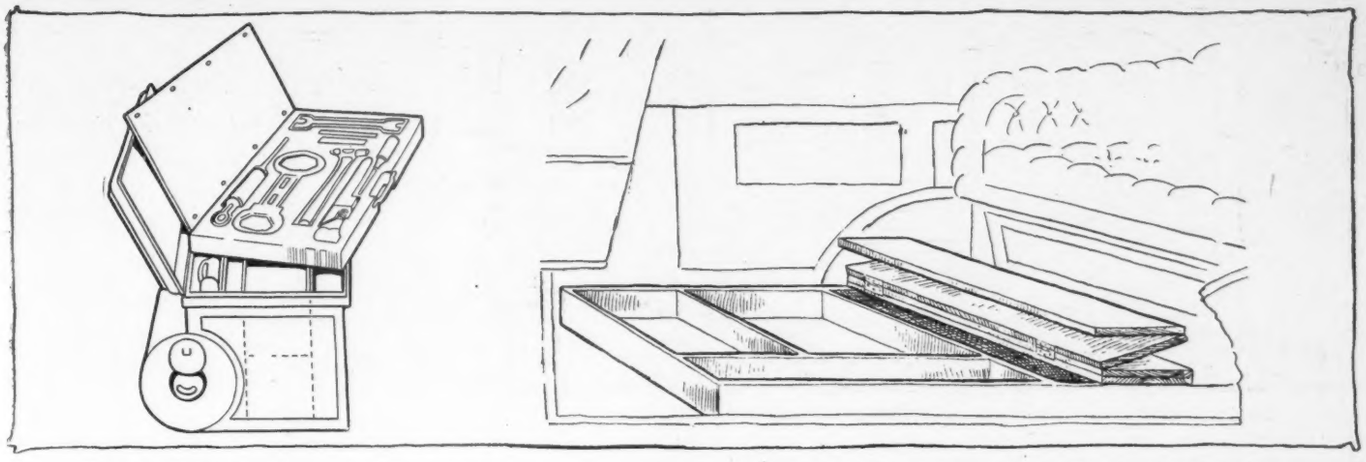


FIG. 12—PEERLESS TANK AND TOOL CASE

FIG. 15—LUGGAGE SPACE UNDER FLOOR OF CORBIN CARS

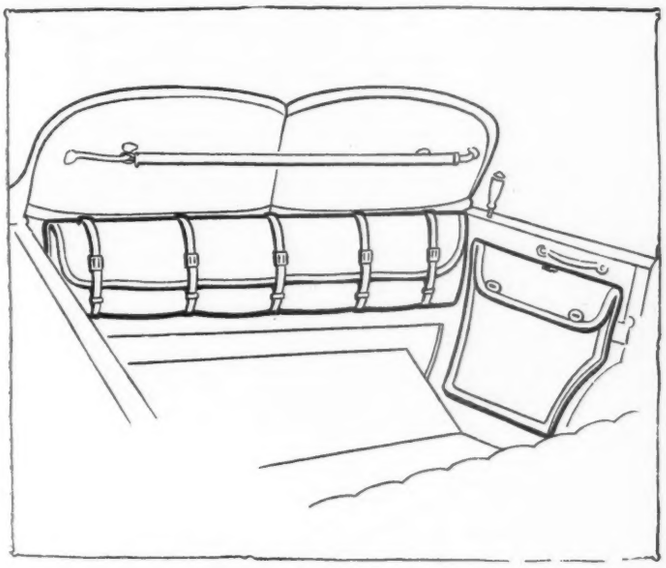


FIG. 13—LUGGAGE FACILITIES IN PIERCE-ARROW TONNEAU

Another ingenious tool box, with a case for the acetylene gas tank combined may be seen on the Peerless cars, as illustrated in Fig. 12. The small tools are carried in a recessed wooden tray somewhat similar to that of the Thomas cars, but instead of resting flat in the upper portion of the box it is provided with an aluminum cover which closes and holds the tools in place, and the tray slips into a specially designed narrow space at the front of the box and rests on its back edge. Special cans, which fit closely into place, are also provided for extra grease and oil; the pump and jack are confined in appropriate nooks, and the acetylene gas tank is rigidly held in a cylindrical section of the box, which has a slot at the end shown through which the gauge on the tank is visible; and the valve rod protrudes through a hole in the other end. The little tool locker below the front seats and in front of the gasoline tank, Fig. 16, which is characteristic of the Pierce-Arrow products, is still retained; and the disposition on the part of some manufacturers to utilize the recess in the arm rest, or division between the two front seats is again becoming popular. The little cabinet thus formed in some cars is found to be very useful. There are other little things, however, in the way of baggage-carrying facilities to be found on the Peerless cars that are worthy of notice, for aside from the usual robe rail and side pockets in the doors, there are extra little pockets in the upholstery at the sides of the tonneau behind the doors, provisions are made in the top for carrying hats and the tire irons located at the right of the driver's seat, one of which is shown in Fig. 8, are designed to fold back against the body when not in use.

Perhaps one of the most ingenious arrangements for extra luggage is the combination luggage compartment and trunk rack of the Franklin cars. When the curved lid which is hinged along its lower edge is closed, a very spacious compartment is formed, which may be very conveniently used for carrying extra tubes, a jack, pump, tire repair outfit, etc., and when opened, as shown in Fig. 14, the lid is supported by two heavy leather covered chains and a very capacious trunk rack is formed. In addition to the facilities thus provided there is a large compartment under the rear seat for top curtains, robes, coats, etc., and drawers are fitted beneath the gasoline tank under the front seats for tools and other small articles. A clever arrangement for extra baggage which in a few years may be universally adopted is to be seen in the Corbin cars, Fig. 15. On folding back the floor boards of the tonneau a number of shallow compartments of various sizes are exposed in which many necessities of a long tour can be carried. In many cars there is room under the body for larger compartments.

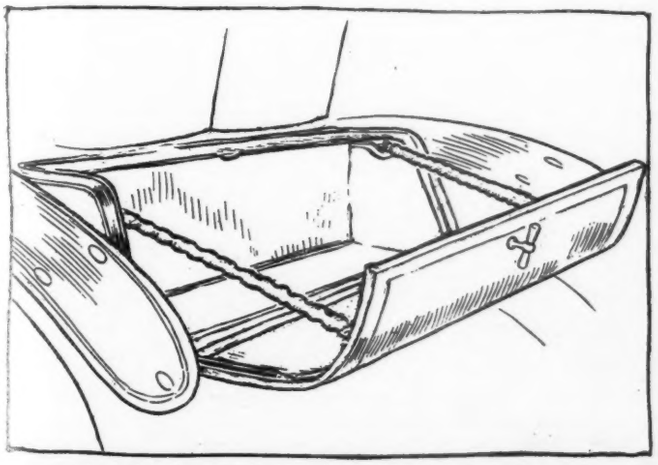


FIG. 14—FRANKLIN'S NOVEL COMBINATION TRUNK-RACK

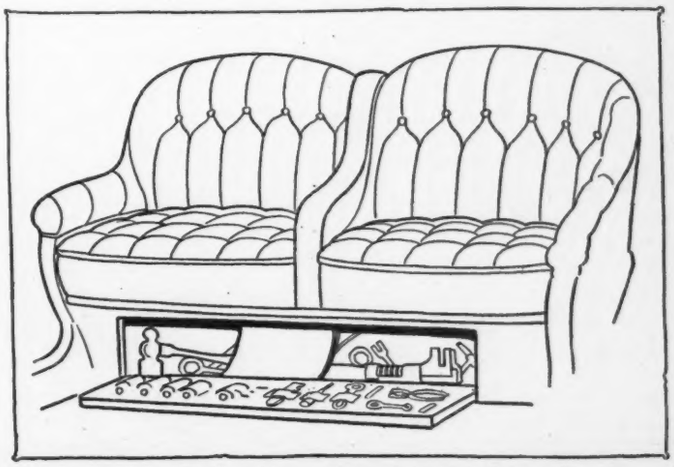


FIG. 16—TOOL-KIT UNDER FRONT SEATS OF PIERCE CARS

LUBRICATION

Part I

FOR the second time Motor Age reviews in connection with the show issues the lubricating systems employed on the cars exhibited at the Grand Central palace show and also those exhibited at the Madison Square garden. A dozen or more illustrations showing the 1910 methods of oiling the motor are given, as well as various means to prevent oil leaking from the different shafts of the motor as well as from the gearbox and the rear axle. A few years ago there were several manufacturers who thought the purpose of the mud apron or sod pan, as some manufacturers call it, was to collect the oil and grease that worked out through the end bearings of the crankshafts and camshafts of the motor, through the end bearings of the gearset, through the ends of the rear axle, and from the clutch and other parts. The majority of these makers already have realized that such is not the role of the mud apron; that the mud apron is to prevent mud being splashed against the chassis parts, such as around the base of the motor, the clutch and the gearbox; and these same makers also have been educated to the fact that the separate task consists in the prevention of oil or grease working out from the points already mentioned.

Legislators Are Satisfied

Two years ago in the large cities discussion was rife in legislative quarters concerning the destruction of brick pavements by oil dripping from the cars. Today we do not hear about this matter at all, and the reason is that in the majority of cars this leakage has been entirely stopped, and not by making the mud apron more meritorious but by a better system of packing, by felt washers, by different types of packing glands, and by return oil passages, so that now any oil or lubricant which works to the outer end of the bearing is prevented from escaping and is conducted back into the crankcase or gearbox.

It is only 3 years ago when several serious accidents were recorded due to oil leaking from the rear axle and finding its way on to the brake surfaces; and, as happened when cars were on steep hills, the brakes failed to work owing to this oil covering them and fatal accidents were avoided only by the sheer good luck. It was a common sight in those days to see the spokes of the rear wheels entirely smeared with lubricant, so that dust was coated over them. Thanks to better rear axle design, this condition now is avoided, and it is possible at the present day to have the most efficient lubricating system in a full floating type of rear axle and yet not be in danger of any of this reaching the brakes or some more of it getting on the wheels, only to be spattered over and injure certain portions of the body.

As the lubrication of the motor is the most vital one, it is natural that concerns should pay first attention to it, and that they do so is borne out of the fact that the 1910 cars have much more adequate lubricating facilities for their motor than many of them had during the past year. As suggested in another part of this issue, this increased oiling facility has been made imperative because of the road races and speedway events of the past season, as well as the desire of manufacturers to compete only in stock-car events. In order to have a car capable of maintaining high speeds for 200 or 300 miles ample lubricating arrangements must be provided, and not in a few of the 1910 cars such arrangements have been furnished.

Four Major Systems Used

There are at present four major systems of lubrication for motors, all of which have their followers. Some of them are gaining in favor, others are approaching an inevitable elimination. System No. 1 may be, for convenience, designated the circulating system, in which the lower part of the crankcase has an oil reservoir in it with capacity ranging from a few quarts to 2 or 3 gallons. In this reservoir, or adjacent to it, is some form of gear or plunger oil pump, which elevates the oil to the level of the crankshaft or higher, forcing it into the crankshaft bearings or to the cylinders, whence it passes through the bearings and falls onto a false bottom of the crankcase, this bottom in some cases consisting merely of cup-shaped depressions into which the lower ends of the connecting rods dip, so that a splash is furnished which rises into the open ends of the cylinders and lubricates the cylinder walls as well as the piston rings and the wristpin bearings in the piston. Once the oil in the cup reaches a certain level it overflows, and by gravity falls into the oil reservoir, whence it passes through one, two, three, and sometimes four, fine-mesh screens for removing any metal or carbon particles, after which it is ready to be once more sent on its circuitous journey through the motor by the oil pump.

It is owing to this fact that the oil is not only sent once but perhaps 100 times through the motor parts, that it is designated the circulating system, the analogy being with that of the flow of blood in the human body, in which the heart is the pump, constantly forcing the blood to all parts; and the lungs take the place of the fine-mesh screens, purifying it once on each circulation, although in order that there may be no misunderstanding it must not be inferred that the role played by the fine-mesh screens is in anywise as efficient in the motor as that of the lungs in the human organism.

Flywheel Oiling Scheme

System No. 2 is another circulating system, but it is without an oil pump, being much as a human being would without a heart were such possible. Although the oil pump does not exist as a separate part of the motor, its role is played by the flywheel, which is present in all motors at the present day. In this oiling system the flywheel is inclosed, and the compartment housing it is filled with oil, so that immediately the flywheel starts rotating the oil is picked up on its periphery, and the faster it rotates the more oil is picked up. Those who have been familiar with the common disk-grinding stone revolving with the bottom submerged in a basin of water for sharpening axes, knives, etc., in boyhood days will recall the tendency of the water to fly from the revolving stone as the speed is increased. The analogy holds good in the case of the flywheel oiling system, the oil being tossed from the wheel by centrifugal force. As it is

thrown away it is caught in chambers above the flywheel, and from these chambers it flows by gravity through grooves, or troughs, on the inside of the crankcase walls, these troughs leading the oil, perhaps, to the four compartments of the crankcase or the crankshaft bearings. As in the circulating system an overflow scheme is furnished and the oil after it reaches a certain level in the crankcase compartments is returned by gravity to the flywheel housing, being filtered en route. Thus we see in this system a striking analogy to system No. 1, excepting that it is more simple, there not being a solitary oil pipe in the whole scheme, and the ordinary flywheel doing the work of the pump.

Mechanical Lubricator Scheme

System No. 3 has, for short, been designated the mechanical lubricator scheme. In brief, it consists of a cubical box-like oil reservoir, located on one of the arms of the crankcase, on the dash in some instances, and in other cases on a separate bracket adjacent to the motor. In this oiler, and a part of it, is a bank of plunger pumps driven by ratchet, belt or other means, there being a plunger for each oil pipe, these oil pipes leading from the apparatus to the different crankshaft bearings or cylinders, as the case may be. Once the oil leaves this lubricator, it does not return, and in case of the motor furnishes the splash which is sprayed into the open cylinders in the identical manner the splash is maintained in the circulating system. With this mechanical type of oiler it is common practice to have the different oil leads located outside of the cylinder or crankcase castings.

System No. 4 was one of the earliest in use in motor cars, and has not an extensive following of makers at the present time. It may be designated the compression, or pressure scheme. It consists of

an oil tank located higher than the parts to be lubricated. In this oil tank a pressure obtained from the crankcase, from the exhaust or from a special pressure pump is maintained, this pressure with the assistance of gravity forcing the lubricant through pipes to the parts to be cared for.

With this general analysis of the lubrication phase of the motor it is in order, before looking at the different individual systems, to add that scores of minor lubrication changes have been made during the past year on chassis parts. Conspicuous in this line is that of fitting a small oil cup, or in many cases grease cup, to each spring bolt. This, in connection with fitting the spring eyes with hardened steel bushings, gives a freedom of spring action not before attained. Where revoluble spring seatings are used on live rear axles grease cups are positioned; large grease cups are now commonly fitted to the differential housing. In fact, it is the practice today on the best cars that where satisfactory lubricating facilities cannot be incorporated in the part itself, then some form of oil cup or grease cup must be attached. All moving parts in the motor car must be lubricated, and it is much cheaper to fit reasonably efficient oil or grease cups and give them a little attention than it is to replace these parts before a season is half over, at the same time having the inconvenience of the car being out of commission during the period of repair.

An example of No. 1 circulating system is the Stoddard-Dayton, Fig. 1. For 1910 this system has been improved in that a rotary type of oil pump P is used instead of the plunger type of last season. From this pump, which is located in the crankcase, as illustrated, a main oil lead L conducts the lubricant to a distributing manifold M, from which radiate eleven oil pipes, which connect with the three crankshaft bearings, the timer shaft, camshaft, and other motor parts. These oil pipes are all secured by brackets to the inside of the crankcase, so that with the exception of a lead connecting with the sight feed on the dash, to show that the pump is operating, there is not a single external indication of the lubricating used in this motor. This greatly simplifies the exterior of a motor, being free as it is from the oil pipes. The capacity of the pump P is such that instead of so many drops per minute of oil being deposited on the different crankshaft bearings there is a continual flow of lubricant to the different bearings.

On the new four-cylinder Reo motor, Fig. 2, a circulating oil system in conformity with the principles of No. 1 is used. As this illustration shows, the oil reservoir R is beneath one end of the crankcase only, whereas several manufacturers have this reservoir extending the complete length of the crankcase. The Reo designer has placed a plunger type of oil pump OP in this reservoir, the pump being driven by eccentric from the camshaft, as illustrated. The oil is elevated through a main lead L to what might be designated a distributing oil pipe D, from which the lubricant escapes at points 1, 2, 3, 4 and 5 to the crankshaft bearings and other parts of the motor. In the main crankcase K a splash level is maintained, and returning means are provided from one-half of the crankcase to the external

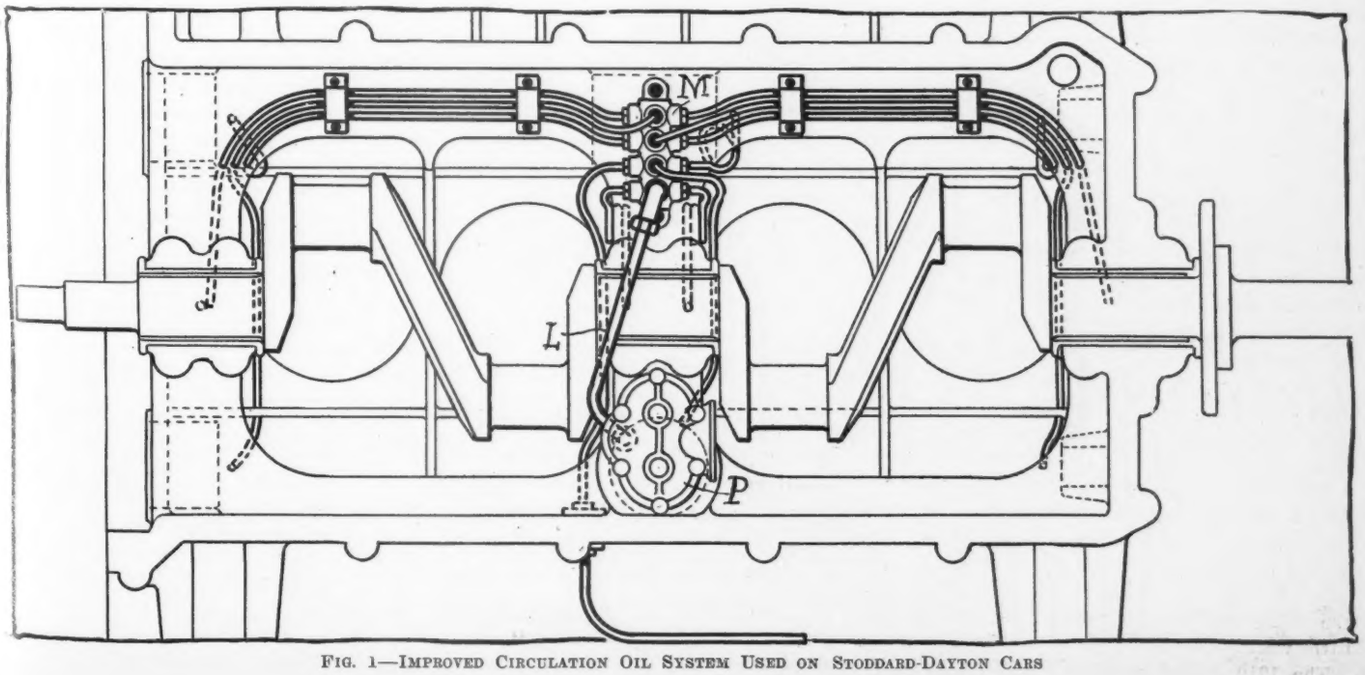


FIG. 1—IMPROVED CIRCULATION OIL SYSTEM USED ON STODDARD-DAYTON CARS

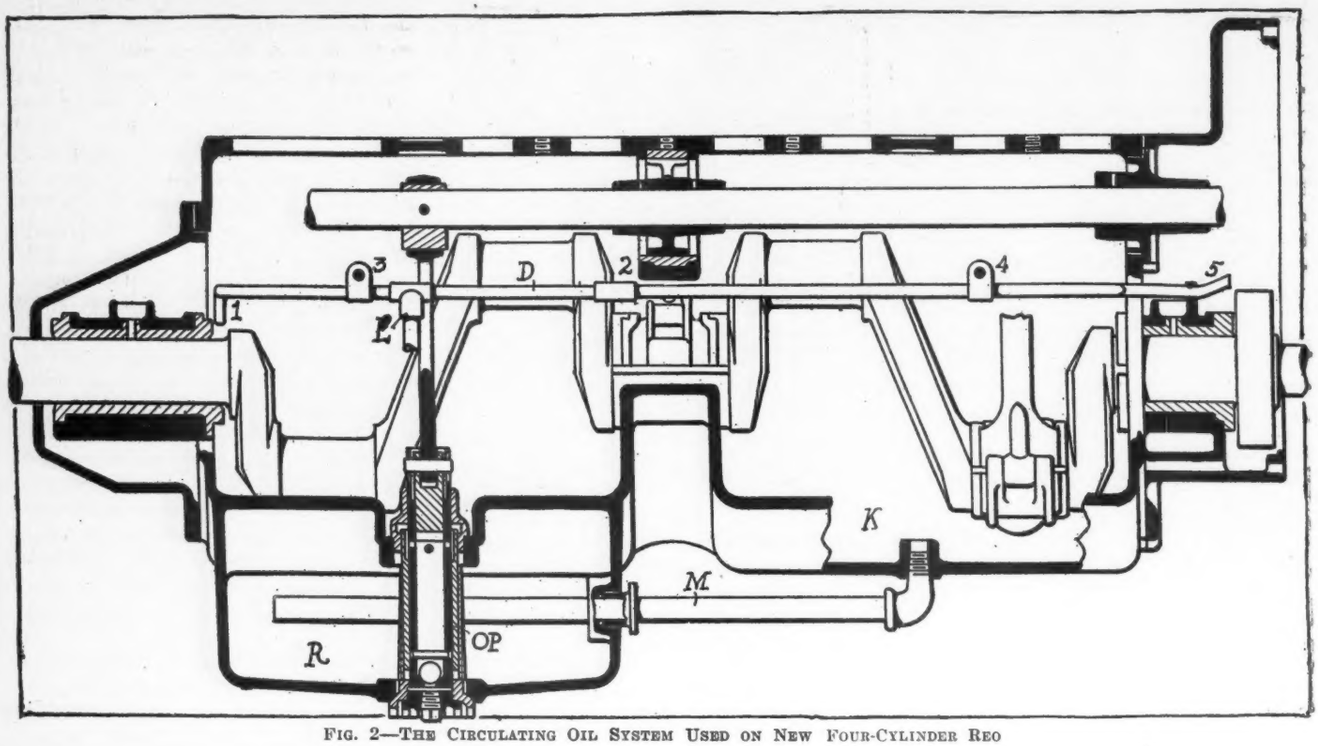


FIG. 2—THE CIRCULATING OIL SYSTEM USED ON NEW FOUR-CYLINDER REO

pipe M, which leads back to the reservoir R. In the other crankcase compartment an overflow provision is arranged for, the oil falling into the reservoir R. The filtering scheme in the Reo is the usual mesh arrangement, which, in this case, entirely incloses the pump, making it impossible for oil to enter the pump without first being filtered.

In Fig. 3 appears an additional diagram showing the main distributing pipe, which, in this illustration, is designated M. At P is a juncture of the main pipe from the oil pump, and 1, 2 and 3 show the distribution of the lubricant to the three bearings of the crankshaft. This pipe is like the Stoddard-Dayton, entirely incorporated inside the crankcase.

Scheme on Continental Motors

The main features of the circulating system in vogue in Continental motors, irrespective of the cars in which they are used, is graphically illustrated in Fig. 4, which is a diagram of the crankcase from end to end, showing how the gear oil pump P is located outside of the case at the rear end, and is generally driven through the vertical timer shaft. This oil pump is in communication with the reservoir R in the basement of the crankcase, and delivers the oil through pipes in the crankcase to the three main bearings 1, 2 ,3 of the crankshaft. The overflow through these bearings rises to a level L in the crankcase proper. This case is divided into a series of compartments and an oil overflow in each, so that the oil is returned to the reservoir in the usual manner. A large oil filler funnel F makes the filling of the oil reservoir a matter of little work.

The 1910 American cars, which heretofore have used a mechanical oiler, or system No. 3, now employ a unique design of the No. 1 system, which is illustrated by side and end sections of the motor in Fig. 5, the end section of which will show more graphically the general layout of the scheme. In this the oil pump OP is readily recognized, it being of the gear variety and located in the reservoir, but it differs from the ordinary in that its driveshaft G angles from the camshaft at the side of the crankcase, giving it an odd appearance. Rising to the opposite side of the motor is the main oil pipe, the arrow in it indicating the flow of the lubricant. This oil pipe, outside of the motor, is designated L and rises to sight feeds S, which indicate whether the oil flow is continuing. From these sight feeds return oil pipes D lead to the four cylinders at points 1, 2, 3 and 4, and in another pipe, not numbered, delivers lubricant to the three main bearings of the crankshaft. It is rarely in circulating systems of this nature that the lubricant is conducted to as many parts as this, namely, to the cylinders as well as to the crankshaft bearings, it being customary either to deliver it to the three bearings or else to the four cylinders, and letting the overflow from each supply the splash. The American, by delivering to both, has instituted a double safety factor. Of interest in this lubricating system, and shown in the end section of the motor, is an adjustment whereby the oil level in the crankcase proper may be regulated. This adjustment consists of a valve which extends into the crankcase, nearly paralleling the main outlet pipe in the oil pump. On the upper end is a handle, by which the valve may be turned, thereby controlling the oil level openings, in the false bottom of the crankcase.

Regal Uses Circulating System

In the Regal cars the circulating oil system, which properly comes under the head of No. 1 system, has been improved in that an oil gauge is located on the left side of the crankcase, this gauge containing as it does an indicating disk, carried

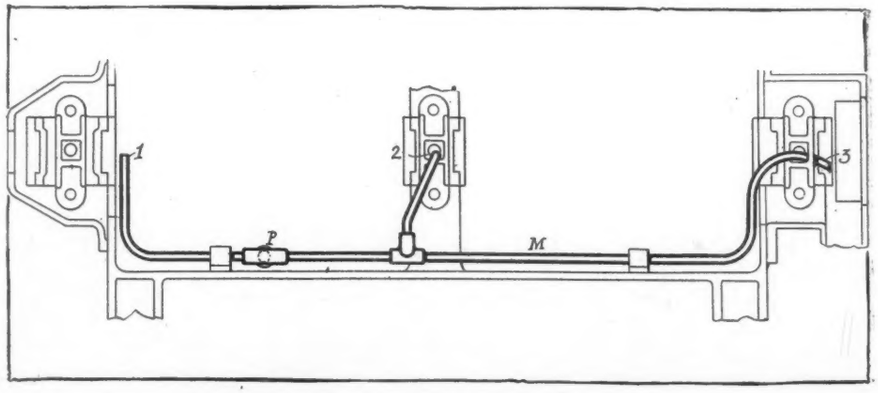


FIG. 3—REO MAIN OIL PIPE LEADING TO CRANKSHAFT

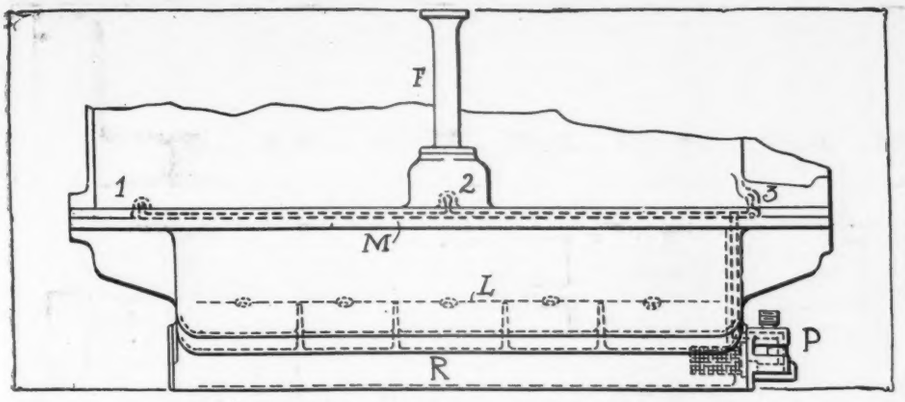


FIG. 4—DIAGRAM OF OILING USED ON CONTINENTAL MOTORS

on a vertical rod, this rod at the lower end resting on a cork float in an oil well. As the oil in the reservoir is consumed the float lowers, thus indicating to the driver the amount of lubricant still on hand. In this motor the oil reservoir is located beneath one-half of the crankcase and the gear pump delivers the oil to the three crankshaft bearings. The addition of a piston ring beneath the wristpin is looked upon to increase the lubricating efficiency of this motor.

In the new motor of the Falcar a circulating system is in vogue, with the pump located in the crankcase basement and driven by bevel gears from the camshaft. A provision is made in this motor whereby dirty oil and sediment may be flushed from the motor and crankcase by kerosene, which in turn may be removed by an oil plug at the bottom of each crankcase compartment.

In the Midland cars, the lubricating of which was illustrated in these pages a year ago, a plunger pump contained entirely within the crankcase is relied upon, the oil pipes from this pump passing from and to the different compartments or bearings, as the case may be.

In the Cole motor, one of the new faces seen at the Grand palace show, the plunger type of oil pump is also used, the location of this pump being in the crankcase reservoir. On the left side of the motor is a ball gauge showing the oil level. The Paterson, another newcomer in the field, follows this design, using a plunger pump in the crankcase. A float oil level gauge is a ready reference as to the oil supply.

Features of National System

In the National oiling system, Fig. 6, particular care is taken that sufficient lubricant is furnished to all parts. This is a conventional circulating system with the oil pump OP corporate with that of the reservoir R, and the oil supply from this being directed to the crankshaft bearings. There are four compartments in the crankcase proper, in all of which a uniform oil level L is maintained, there being two overflow pipes communicating with the reservoir, and the filtering scheme is shown. It is worthy of note that over each crankshaft bearing are pockets P for containing lubricant, and at the forward end two openings or drill holes H allow this lubricant reaching the full length of the bearing. The half-time gears operate in oil, and as the arrow indicates there is provision for overflow from these into the crankcase itself. The care shown by this company in lubricating each of the lower connecting rod bearings is shown in Fig. 10, in which two views of the connecting rod R are given. It is shown how the lower end of the connecting rod has two drill holes B, one at each side of the rod, into which the splashed oil can fall, and on the other side is a scoop S which dips into the oil level, once each revolution, and through this scoop the oil finds the inside of the bushing. There are thus three systems of oil on each lower connecting rod. Referring again to Fig. 6, at the flywheel end, it will be noted by the arrows how any lubricant which should reach the other end of the bearing is prevented from escaping by the shoulder on the bushing, and the short auxiliary bushing which has a shoulder against the outer end of the crankcase.

The Marmon system of lubrication has, since its inception, been reputed as being one of the most thorough in use in the present day. It is a circulating one, in which the oil is not only conducted to the three crankshaft bearings but the crankshaft is drilled and through it the oil is conveyed to the lower bearings of the connecting rod. The Marmon company does not stop here, but, as Fig. 7 shows, the oil is led up through pipes K on the connecting rods to the wristpins W, so that there is a positive propulsion of oil from the oil pump P in the crankcase to eleven

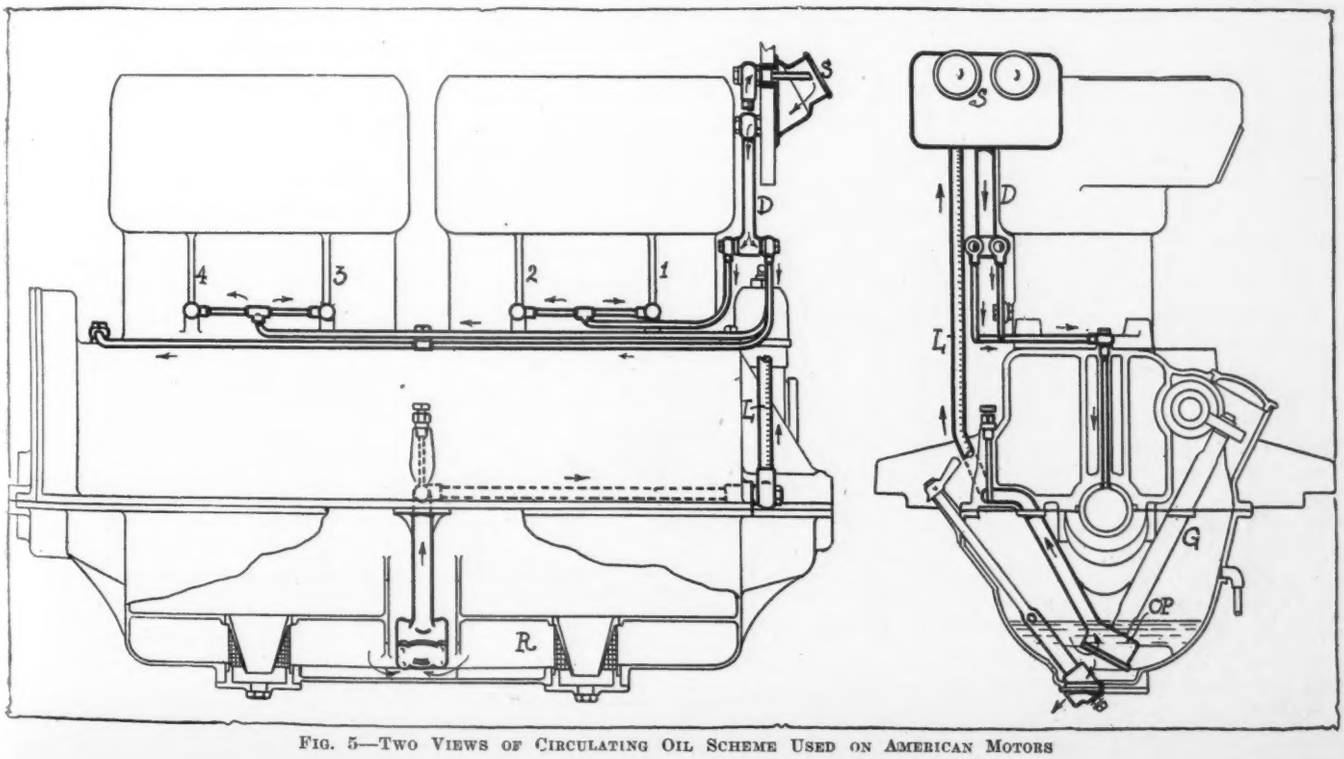


FIG. 5—TWO VIEWS OF CIRCULATING OIL SCHEME USED ON AMERICAN MOTORS

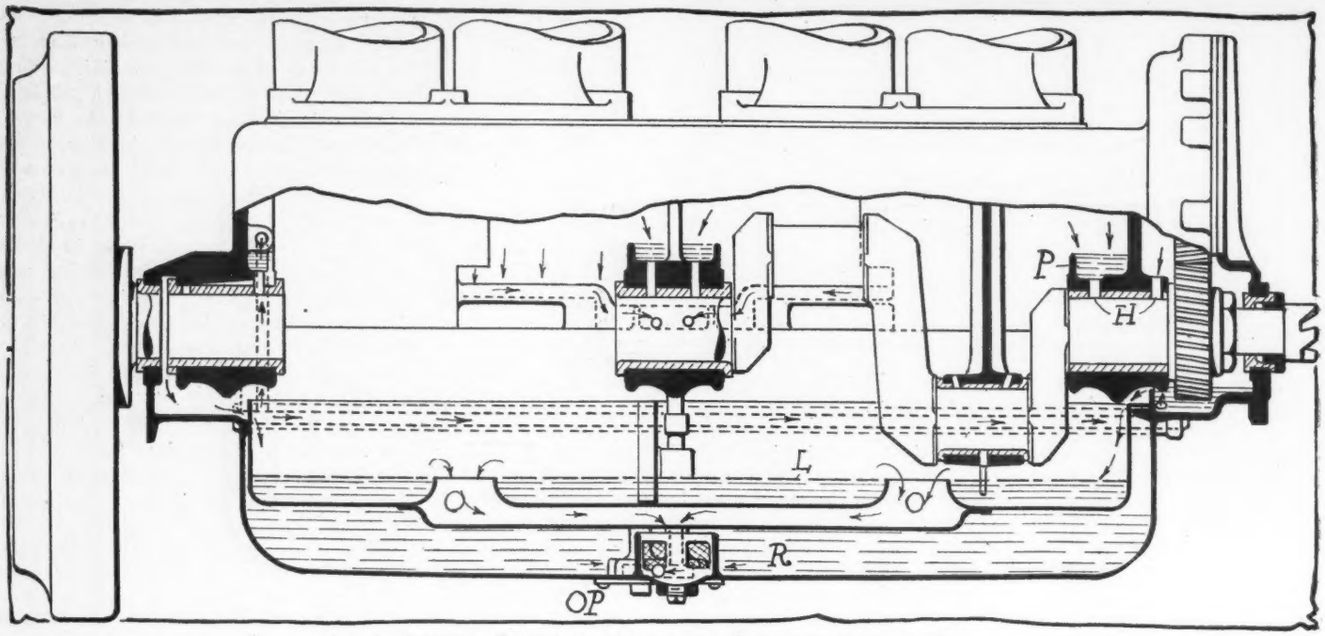


FIG. 6—COMPLETE DIAGRAM OF CIRCULATING SYSTEM ON NATIONAL CARS

bearings of the motor, namely, three on the crankshaft, four at the lower ends of the connecting rods, and four at the wrist-pins. In order to make the oil level as readily determined as possible, a cork float is incorporated in the oil well C and gauge G at the side of the cylinders that connect therewith, so that the level in the reservoir R can be seen at a glance at any time. The screen S for filtering the oil once during each circulation appears. This illustration shows graphically the exact course of the oil from the pump P through the main lead L to a dial D on the dash, as well as through a manifold M which conducts the oil to the crankshaft bearings 1, 2 and 3. The cylinder walls, cam, camshaft bearings, gears and valve tappets are oiled by the lubricant thrown off the cranks of the crankshaft.

Marmon Not Strictly Splash

Readers will readily recognize that the Marmon system is not a splash one, such as the reader has a popular conception of. The connecting rods do not dip into an oil level, but the overflow oil from the wrist-pin bearings and connecting rods creates a mist which cares for the cylinder walls and other parts of the motor. On the rear end of the crankshaft return oil passages are furnished and an integral oil ring on the crankshaft prevents oil passing it, due to the fact that the circumferential speed of this ring is sufficiently greater than than of the crankshaft bearing, and the oil is thrown from it by centrifugal force into a groove in which the ring is located and from this groove it runs back to the crankcase.

The Inter-State oiling system appears in Fig. 9, this showing the forward half of the motor, disclosing as it does the reservoir R, in which the oil pump is located, and the oil supply carried. This motor uses the splash system, the connecting rods dipping into miniature oil cups C in the false bottom of the crankcase. The size of these cups bears good evidence of the fact that it is not the great supply of oil but rather the system which is of first importance. These cups are kept constantly filled by the circulating system, and the overflow is returned in the usual manner to the oil reservoir. A rotary oil pump is used for circulating the oil through the indicator on the dash, and thence to the crankcase, where the splash is maintained.

In Fig. 8 appears a typical example of No. 3 lubricating system, namely that in which a mechanical oiler L is located in the crankcase or on a bracket at the side of the motor. In this lubricator is located a bank of pumps which deliver oil through leads 2, 4 and 5, to the three crankshaft bearings, and through other leads connecting to the rear of the flywheel, and the other to the forward end of the motor. In this motor the crankshaft, as indicated, is hollow, the arrows showing the method of how the oil after flowing out of the three main crankshaft bearings falls into eccentric rings attached to the throws of the crankshaft, and from these rings it courses through the crank throws into the lower connecting rod bearings.

Followers of Mechanical Lubrication

There are many other examples of American cars in which the mechanical lubricator scheme, such as employed on the Pennsylvania, is used. On the Mitchell cars it is furnished, the Lavigne lubricator being located at the right front of the motor. It has six leads, two of which go to the four cylinders, one branching to the front pair and the other to the rear pair,

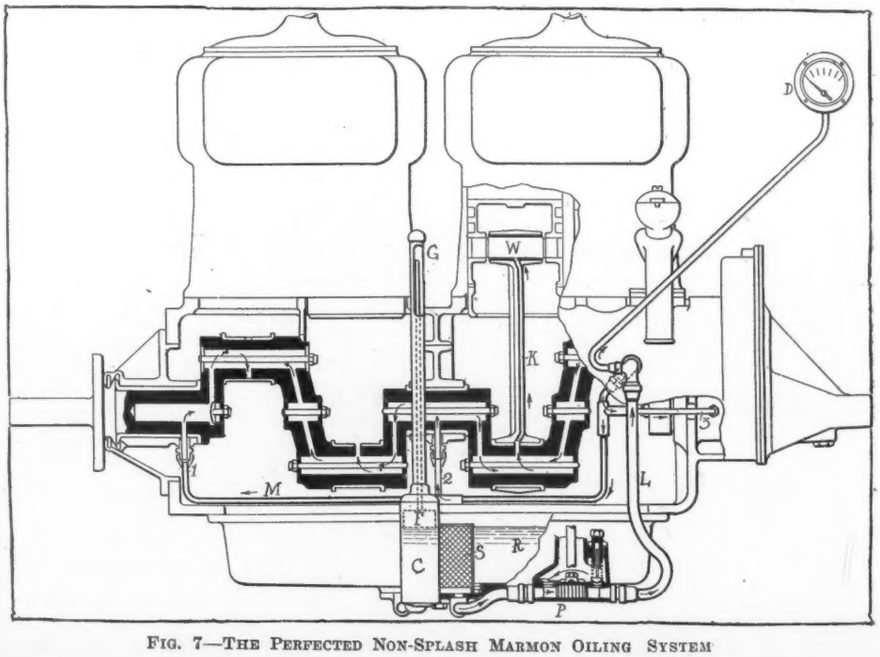


FIG. 7—THE PERFECTED NON-SPLASH MARMON OILING SYSTEM

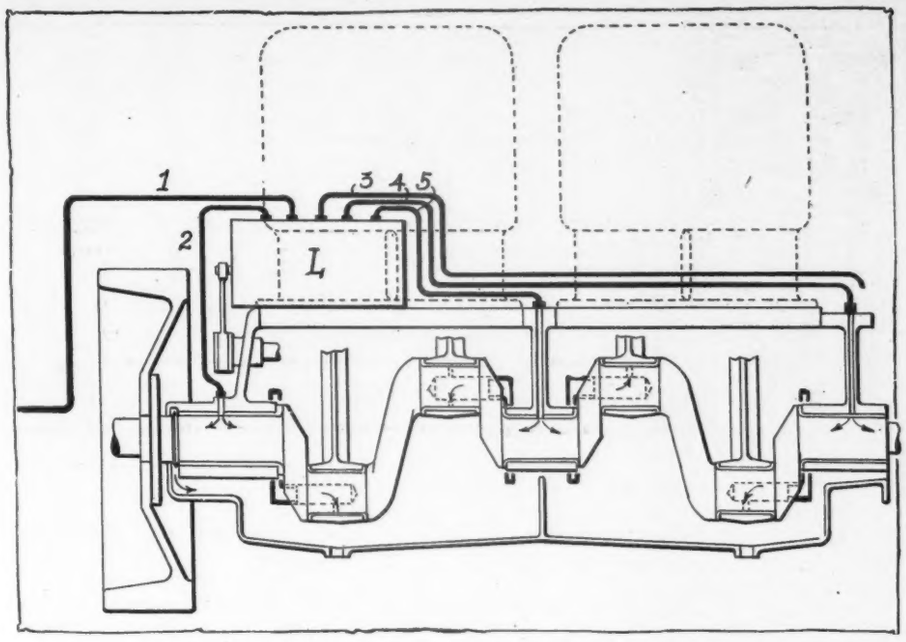


FIG. 8—MECHANICAL LUBRICATOR SYSTEM ON PENNSYLVANIA MOTOR

and the remaining four leads—two connect with the end bearings of the crankshaft, one passes to the clutch and the other to the crankcase. Splash lubrication is used for the connecting rod bearings, wristpin bearings and cylinder walls.

In the Chadwick six-cylinder cars the mechanical system of motor lubrication has been carried out particularly elaborately, so that not only are all parts of the motor cared for but oil pipes lead from the lubricator to the differential, to the gearbox, to where the driveshaft enters the gearbox as well as where the jackshaft exits from the gearbox. In all of these places where lubricant is directly delivered circular disks of felt or other means are provided to prevent the escape of this lubricant.

On the Premier motors the mechanical oiler or lubricator mounted on the left side is continued. This oiling scheme has been considerably improved by minor details during the past season. The usual leads emanate from the lubricator and connect directly with the several motor parts.

In the Oakland, splash lubrication is used, an oil level in the crankcase being maintained by gravity feed from the oil reservoir, as well as by a plunger pump which delivers the oil through a sight feed to the center bearing of the motor. The pump used is of the plunger type and is driven off the camshaft.

On the line of Kissel cars the positively-driven mechanical oiler of system No. 3 is in use, the leads from the oiler delivering in measured quantities to each of the cylinders as well as the end bearings of the crankshaft. The crankcase is provided with a partition maintaining a proper oil level beneath the different cylinders, and from which level the crankshaft splash cares for the lubrication of the connecting bearings and cylinder walls.

Returning again to a consideration of some other examples of the No. 1 circulating system, a common one of this type is that used on the Rutenber motors, Fig. 11, which motors are used in not a few of the assembled cars on the market today. There is little out of the ordinary in this system, and it has not been altered much during the last year excepting in that plain bearings are used for the vertical shaft S which drives the oil pump. The pump P is of the gear type, located in the forward end of the crankcase, and draws its supply from the reservoir R, delivering it to a pipe L, which this year rises alongside of the motor, so that sight feeds may be incorporated with it. The arrows show the flow of lubricant through this pipe, and in the Rutenber motor the oil is delivered to the four cylinders at points 1, 2, 3 and 4, so that the overflow from these furnishes the splash. The four connecting rod bearings are oiled by means of pockets above them, these pockets being filled from the splash. One car using this motor and this oiling system is the Halladay; another make of car employing it is the Glide line, made by the Bartholomew company.

Light Four Mora's Practice

On the new Light Four Mora a circulation system is fitted with a gear-driven pump, which delivers to a sight feed oiler on the exhaust manifold, whence the oil flows through ¼-inch copper pipes to the main bearings and pistons. A scheme is fitted for regulating the splash level into which the connecting rods dip. This consists of a copper standpipe and a thumb nut screw which rise into the crankcase, the oil when higher than the top of the standpipes draining back into the reservoir. This might be designated a combination circulation and gravity system, in that it is a gravity flow from the oiler on the exhaust manifold to the bearings of the motor.

Coming next to the No. 2 oiling system, namely, that in which the flywheel of the motor is the lubricator, a short analysis of two examples of this system will serve to give a fairly clear conception of its operation. On the three Jackson models it is employed, and it is also in use on the Ford car. Fig. 13 shows its adaptation to the Jackson line, in which the flywheel is

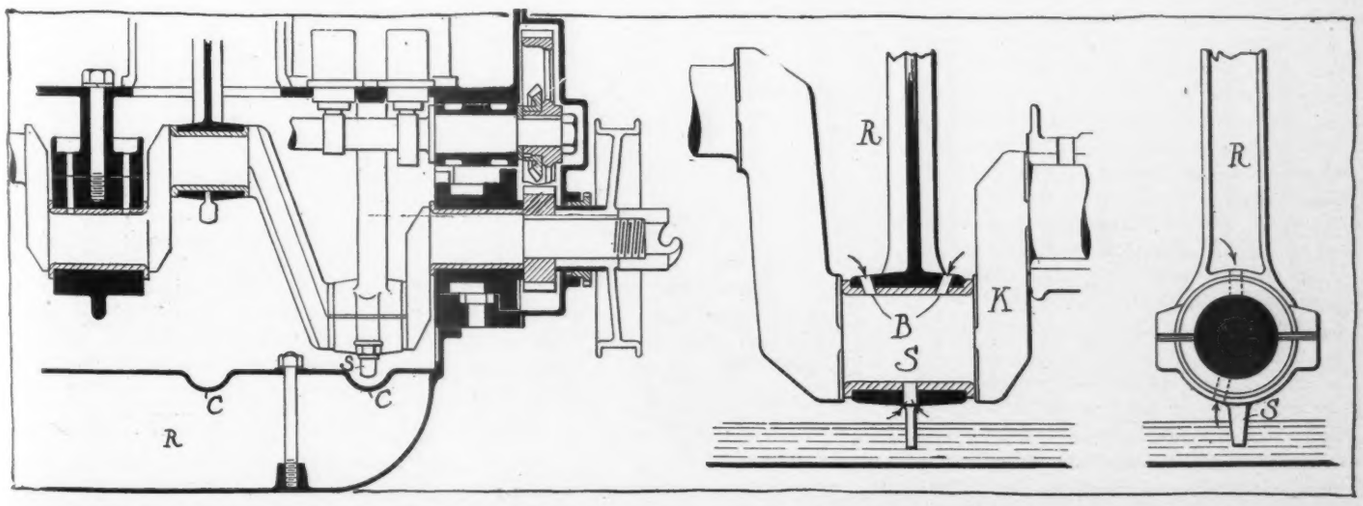


FIG. 9—CIRCULATING SYSTEM ON INTER-STATE CARS

FIG. 10—OILING NATIONAL CONNECTING RODS

housed in casing C, the top of which casing is removed, showing a scoop or horizontal plate S, which collects the oil as it is thrown from the flywheel, due to centrifugal force. This oil is immediately led to a pocket R, which delivers it through the end of the crankcase to another pocket P, which furnishes the supply to the fifth bearing of the crankshaft. The oil from this bearing falls into the compartment K4, where it forms a splash and into which the connecting rod dips, the splash oiling the lower connecting rod bearing as well as the cylinder walls. A goodly portion of this splash enters the groove G on the side of this crankcase compartment, and from this groove it flows by gravity to the compartment K3 beneath the third cylinder. Here another splash system is set up, which helps to fill the pocket P, or No. 4 crankshaft bearing. It also fills, by the way, a groove G, which carries the oil to compartment K2, and by similar operation this splash is conveyed to the front cylinder compartment K1, as well as to the pocket P over No. 1 crankshaft bearing. Should the oil level exceed the predetermined height in any of the compartments, K1, K2, K3 and K4, it overflows into a reservoir R1 and drains back to the crankcase compartment. Fig. 12 shows the care which the Jackson people have taken to oil the front, or No. 1 crankshaft bearing, as well as the timing gear. This illustration shows two oil pockets P, one above the other, the oil from the lower one passing directly to the crankshaft bearing, and that from the upper one flowing by gravity into the timing gear.

Ford and Maxwell

On the Ford cars a similar system of lubrication is employed. In the Maxwell line of cars a compression oiler, designated system No. 4, is used on some models, and the mechanical oiler, system No. 3, on others. A feature of all Maxwell motor lubrication, however, is an oil groove which is attached to the base of the cylinder and into which the bottom of the piston dips at the bottom of each stroke. The oil from the lubricator is fed to these several oil grooves, and once in each revolution this oil is picked up by the piston and distributed over the cylinder wall. The Maxwell crankcase is divided into four compartments, one for each of the connecting rods, and the dip of the connecting rods furnishes a splash which takes care of the crankshaft, connecting bearings and other parts of the motor.

McCord & Co. has brought a new type of mechanical lubricator, to serve in conjunction with a No. 3 system, and which lubricator is illustrated in Fig. 14. An important feature in conjunction with this is that instead of having a pump for each oil pipe there is what is designated a master pump, which supplies any number of leads, this pump being located on the dash D and having a sight feed S showing through the dash, so that the driver can at any time convince himself of the certainty of the lubricating system. This pump has another commendable feature, namely, an adjusting pedal PD, whereby, by foot pressure, the flow of oil can be changed should the car be traveling up a long slope, where more oil is needed, or coasting down a decline, where a less amount is required. The master pump of this lubricator is of the plunger type, located in the reservoir R. The ball check valves, forming a part of the pump, are shown. The plunger P is reciprocated by an eccentric working in the yoke at the top of the pump.

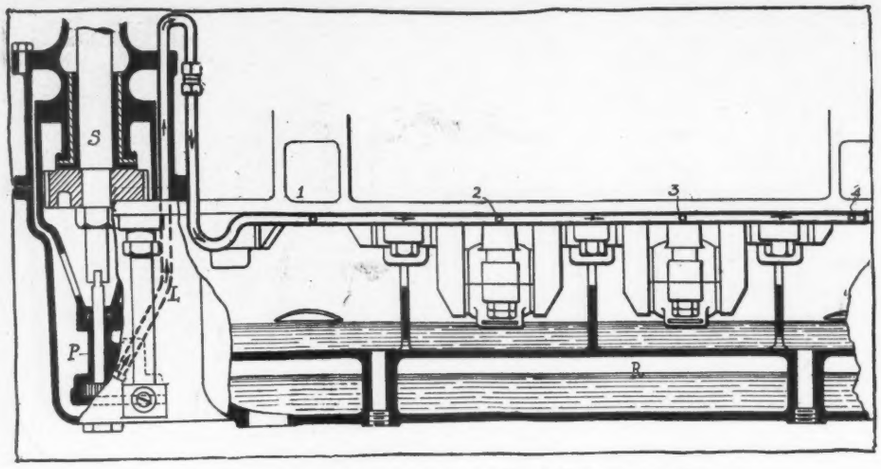


FIG. 11—RUTENBER OILING SCHEME OF NO. 1 CIRCULATING SYSTEM

A couple of methods employed for the careful lubricating of the end bearings of the crankshaft, as well as the preventing of the escape of lubricant from these, are shown in Figs. 15 and 16. In Fig 15 a scheme is used to prevent leakage of oil at the flywheel end, consisting, as it does, of a reverse thread RT, as well as a packing F. The use of the reverse thread is that through the speed of the crankshaft, the oil is forced backwards in these grooves—that is, away from the packing. The end bearing of this connecting rod S also shows the care with which the lubrication of the crankshaft is worked out. The oil lead enters at L, and the bushing is cut away at B along the top so that the oil is distributed the complete length of the bearing. This precaution avoids any possibility of a bearing seizing provided the lubrication system is operated. In Fig. 16 is shown a precaution on National cars to avoid oil leakage at the flywheel end of the crankshaft bearings. The oil is thrown by splash into a pocket P and reaches the bearing through a pair of drill holes D and D1. In order that the oil may reach the outer drill hole D1 the housing is beveled at K, thus giving the oil a chance to divide and flow into the direction of the arrow to the outer drill. It will be noted that in order to avoid leakage the bushing is shorter than the bearing length and has a shoulder at the other end resting against the bushing. Beyond this bushing is an open annular space, and at the outer end of the casting and secured by countersunk screws is another ring with a shoulder bearing against the end of the case, this double precaution entirely preventing the escape of oil. The return oil passage R conducts the oil back

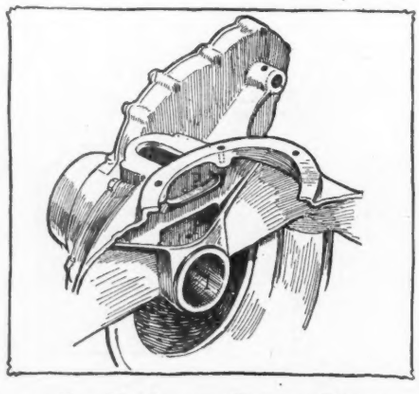


FIG. 12—JACKSON BEARING OILER

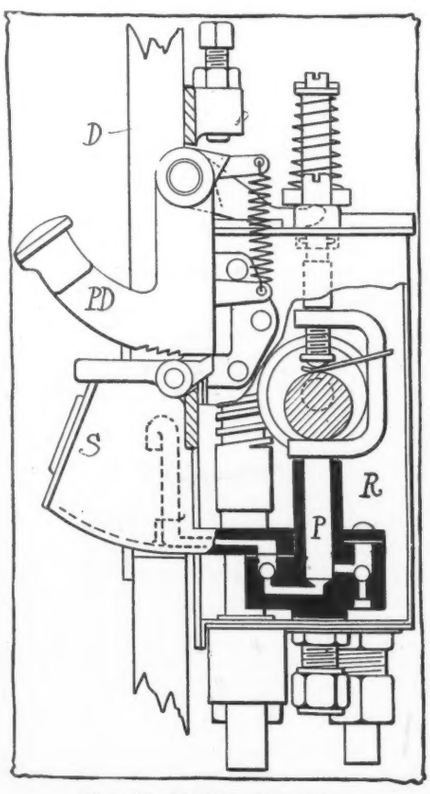


FIG. 14—MCCORD LUBRICATOR

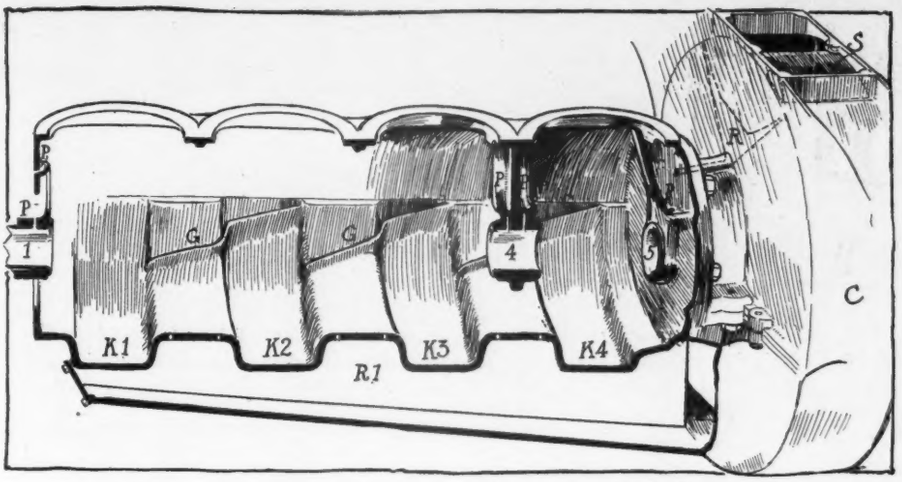


FIG. 13—FLYWHEEL CIRCULATING OIL SYSTEM ON JACKSON CARS

to the crankcase C, beneath which is the reservoir R. A leather washer W prevents any of this return oil passing direct to the reservoir R, so that it must follow the regular course and be filtered en route.

Standard Six Scheme

A circulating system of lubrication is used on the Standard Six cars, but it is not entirely self-contained, as there are external leads. The oil from the crankcase proper, after reaching a certain level, drains back into the sump or lower portion of the crankcase. Here it is strained and then taken up by a positive gear-driven pump, forced through a sight feed on the dash and back into a very small distributer from which there are three leads, which carry the oil back into the three divisions of the crankcase. These partitions in the crank chamber prevent the oil from accumulating in either end. The passages through which the excess oil overflows into the reservoir underneath are cast in the sides of the crankcase, and are of large proportions so that obstruction is impossible.

Lubrication on the Black Crow cars is of the self-contained, constant level splash system, with a plunger pump to maintain the circulation. It is self-contained because there are no outside reservoirs or external leads, nor are there any sight feeds. The oil supply is contained in a reservoir cast integral with the lower half of the crankcase. It is drawn from this reservoir by a plunger pump, which is driven from an eccentric cam on the camshaft inside of the crankcase, and forced into the crankcase proper where lubrication of the crankshaft, connecting rod, and in fact all internal bearing surfaces is by splash. After a predetermined level has been reached in the crank chamber, the oil overflows into a standpipe where it is strained and returned to the oil reservoir underneath. In order to prevent the oil from accumulating at either end of the crankcase, when climbing or descending hills, or from the motion of the car, three transverse partitions are provided in the crank chamber.

Moon Uses Mechanical Lubrication

On the 45-horsepower car of the Moon line, lubrication is maintained through a mechanical, force-feed Lavigne oiler, which is located under the hood close to the motor, and gear driven off the camshaft. The oil is forced to the engine through seven leads, one to the water pump, one to the oil pump and one to the magneto, and there are three leads to the three main bearings of the crankshaft, and one to the timing gear compartment at the front end of the motor. The oil feed to these leads is adjustable and automatic inasmuch as the speed of the oil pumps in the oiler is proportional to that of the motor. In the small 30-horsepower car, turned out by the Moon company, a self-contained circulating splash is used, the oil supply being contained in a reservoir cast integral with the bottom of the crankcase. As in the systems of this type previously described, the oil is raised from the reservoir by means of a positively-driven gear pump and conducted to the crankcase proper, where splash lubrication to all internal bearings is maintained. All excess oil drains back to the oil reservoir.

The Courier car, which makes its first appearance on the market this year, is also an advocate of a circulating oiling system. A reservoir has been provided in the bottom of the crankcase, which has a capacity for approximately 2 gallons of oil. From this reservoir the oil is drawn through a pipe to a plunger pump, driven by an eccentric on the camshaft. From this the oil is forced through a sight feed on the dash and then to the camshaft and crankshaft bearings, and distribute through the crankcase, then returns again to the reservoir to be again circulated.

In gearboxes the matter of preventing oil leaking is particularly important if the gearset is of the vertical design, namely, that in which the countershaft is in the bottom of the case, and the mainshaft above it, or vice versa. This means that the lubricant level in the case is higher than the bearing plane, whereas if both main and countershafts are in the horizontal plane it is not necessary for the lubricant level to be as high as this plane. With the vertical design of case many of the makers use a one-piece housing and thread caps over the opening in the housing, these caps having packing glands incorporated with them.

Preventing Oil Leakage

Regarding the means of preventing oil leaking from the end bearings of the gearbox and the rear axle, no illustrations are given herewith. With reference to the rear axles, the common practice is to use the felt washer or packing as it is designated. In connection with this one or two makes of cars are fitted with steel washers, which act as reinforcers and stiffen, if it might be so expressed, the washer packing. This scheme is followed also in connection with the short pinion shaft, in the differential housing, which shaft attaches to the propeller shaft with a universal joint.

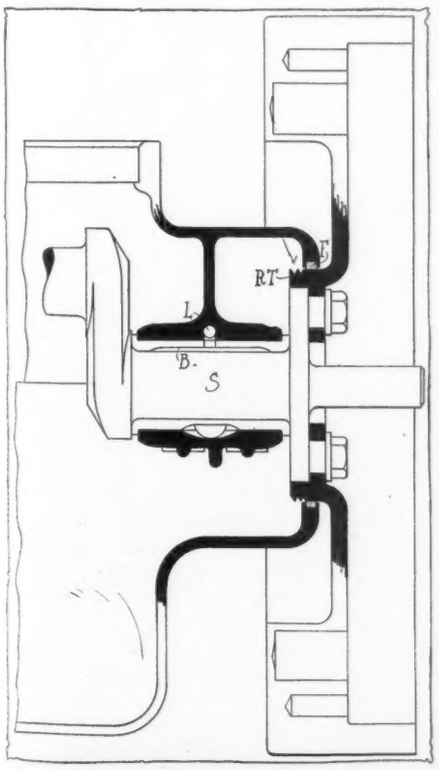


FIG. 15—PREVENTING OIL LEAKS

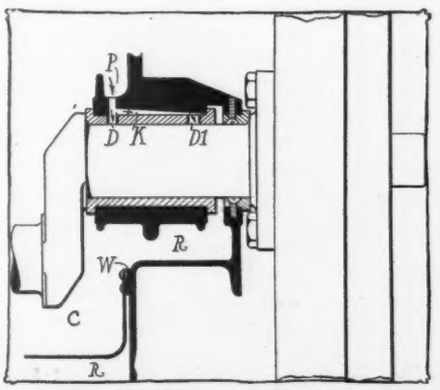
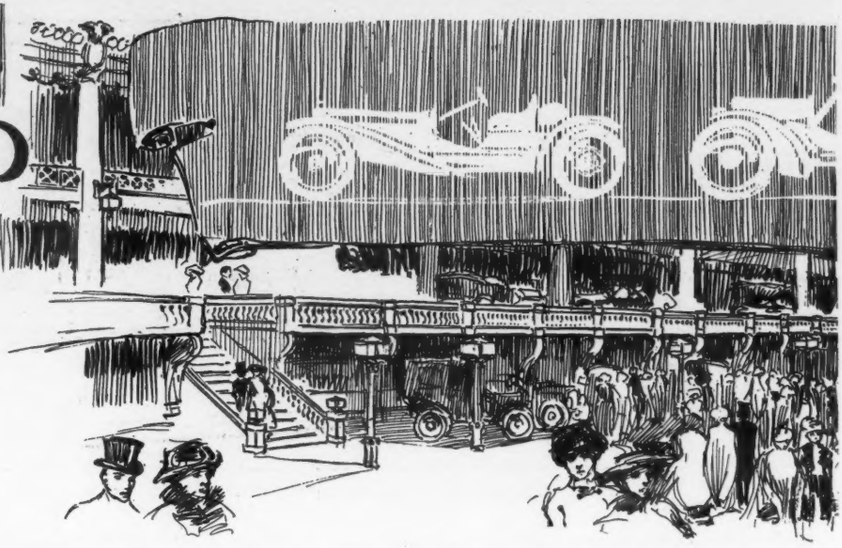


FIG. 16—PREVENTING OIL LEAKS

(To be continued.)

A.L.A.M. LICENSED CARS for 1910



MEMBERS

American Locomotive Co.
Apperson Brothers Auto Co.
Autocar Co.
Bartholomew Co.*
Brush Runabout Co.*
Buckeye Mfg. Co.*
Buick Motor Co.*
Cadillac Motor Car Co.
Chalmers-Detroit Motor Co.
Corbin Motor Vehicle Corp.
Columbia Motor Car Co.
Dayton Motor Car Co.*
Elmore Mfg. Co.
Everitt-Metzger-Flanders Co.
H. H. Franklin Mfg. Co.
Haynes Automobile Co.
Hewitt Motor Co.
Hudson Motor Car Co.
Jackson Automobile Co.*
Knox Automobile Co.
Locomobile Co. of America
Lozier Motor Co.
Matheson Motor Car Co.
Maxwell-Briscoe Motor Co.*
Mercer Automobile Co.
Mitchell Motor Car Co.*
Moline Automobile Co.*
Moon Motor Car Co.*
National Motor Vehicle Co.*
Nordyke & Marmon Co.*
Olds Motor Works
Packard Motor Car Co.
Palmer & Singer Mfg. Co.
Peerless Motor Car Co.
Pierce-Arrow Motor Car Co.
Pope Mfg. Co.
Premier Motor Mfg. Co.*
Regal Motor Car Co.*
Reo Motor Car Co.*
Royal Tourist Car Co.
Alden Sampson, 2d
Selden Motor Vehicle Co.
Simplex Automobile Co.
F. B. Stearns Co.
Stevens-Duryea Co.
Studebaker Automobile Co.
E. R. Thomas Motor Co.
Waltham Mfg. Co.
Willys-Overland Co.
Winton Motor Carriage Co.

*Not exhibiting

Most Makers Are Content To Stand Pat as to Horsepower—Few New Models

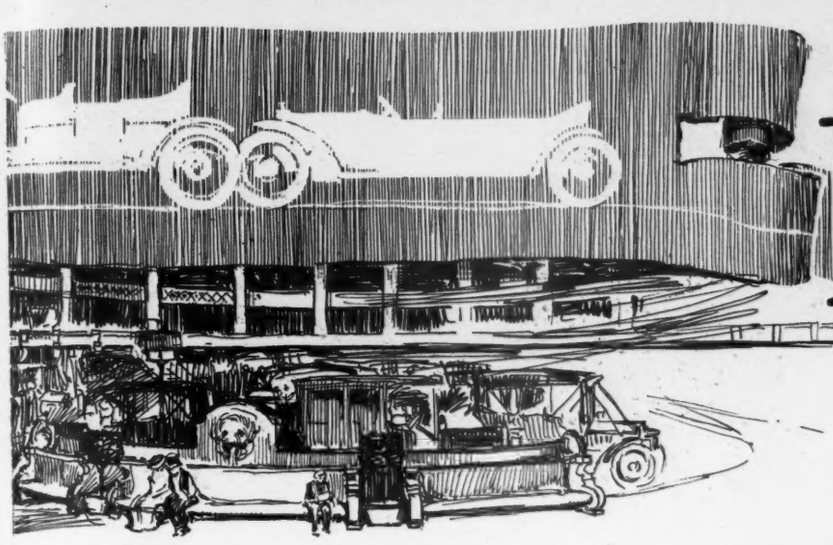
LOOKING over the numerous and varied changes that have been made by the different manufacturers who are members of the A. L. A. M., in their 1910 models, it will be opportune to make a few general observations on what appears to have been the trend of change, or such improvements, if we may call it, for the 1910 models. The motors have been treated exhaustively elsewhere, and a general statement to the effect that in the major part there has been no change in the horsepower is in order. There are many concerns like Locomobile, Peerless, Packard, Royal Tourist, Matheson, Franklin, Corbin, Winton, Palmer & Singer, Stearns, Studebaker-Garford and Pope-Hartford which have not made a solitary change in the size of the motors in any of their models. There are other concerns like Pierce, Oldsmobile, Chalmers-Detroit, Buick, Stevens-Duryea, Thomas, Apperson, Cadillac and Alco which, in not a few cases, have left the horsepower in some of their models alone but have increased it in the others by adding either to the bore or stroke, or in some cases to both. Only two cases are on record, namely, the Haynes and Autocar, where the motor power has been considerably reduced.

There has not been that wholesale production of new models or types during the past season that was observed a year ago. A few concerns have added new models, among which can be noticed the Knox six, Stevens-Duryea six, another type of Thomas small six, etc. There has been not a little redesigning of motors in several instances, among which are the Franklin improved air-cooling scheme, the new high duty type of motor used on one of the Elmore models, in which the mixture is pumped into the combustion chamber, and considerable redesigning in several types. Among the new faces must be noted the White gasoline car seen for the first time at a New York show. The Overland car is in this show for the first time, having gained a place through the purchase of the Pope-Toledo license. The Hudson is a new member, although on the market for some time. The Flanders will make its debut at this show, and not a few important changes will be discovered in many of the other cars since they were seen a year ago.

The fact cannot be overlooked that large diameter wheels are becoming more popular, and although there has not been any new convert to the 42-inch size, there has been a perceptible increase from 36 to 37-inch sizes, and in a few cases these run as high as 38 inches for the rear wheels of heavy touring cars, limousines and landaulets.

It is safe to say that with many makers a few parts of the cars have come in for more attention than the oiling scheme. The Stearns company on its 30-60 models has installed a system which takes the place of the mechanical oiler. The new Haynes type of motor has a similar system. On the Corbin some change has been made in the nature and position of the pump. The Peerless company has added improvements by incorporating its pumps in the oil reservoir in the crankcase. The Royal Tourist has redesigned its system considerably, and in the Pope-Hartford there has been a combination of circulating and pump scheme incorporated. To this list many others might be added if time sufficed, but all are indicative of the prominent place lubrication occupies today and must continue to occupy in the motor car.

With many manufacturers the elimination of noise has been a potent factor, and this has been done in some cases by inclosing the timing gears on the motor, if they were not previously inclosed; by using helical timing gears instead of those



A.I.A.M. PLEASURE ELECTRIC COMMERCIAL

Dual Ignition Gaining in Favor—Dry-Disk Clutch One of the New Things

of the spur type; by reducing the clearance between the tops of the valve tappets and the bottoms of the valve stems; and a score of other means.

The dual ignition system is gaining in favor, concerns which used the double system a year ago having discontinued it for this year. The Locomobile company continues as practically the sole exponent of the make-and-break spark, excepting on the Matheson four-cylinder car.

In the clutch system an introduction of this nature would be incomplete without commenting and passing on the dry-disk clutch, which has come to the fore. The real pioneer of the dry-disk clutch is the Stevens-Duryea company, which introduced the multiple-disk clutch many years ago and faced the alternate disks with leather, which clutch operated without lubrication. This has continued to operate and be used by this concern ever since, with minor modifications. Last fall, however, the Packard company introduced a dry-disk clutch faced with thermoid or some similar metallic asbestos-woven fabric, and not long after this announcement was made came that from the Stearns company introducing a similar type of clutch, excepting that a greater number of disks is employed. With the exception of these few innovations in the clutch line this phase of the motor car remains much as it was a year ago, excepting by way of detailed changes, such as the introduction of springs and multiple-disk clutches to insure more rapid disengagement.

In the matter of gearboxes there is scarcely any change; those who have heretofore located the gearbox amidship continue to do so; those who have incorporated it with the rear axle have not molested this design; and those who previously have formed it as a unit with the rear axle continue to leave it there, there being but two exceptions to this general statement, one being the new Haynes, in which the gearset heretofore located as a separate unit amidship is now a corporate part of the motor, and on the Thomas little six the gearbox which previously was on the rear axle is now mounted as a separate unit in the center of the car.

With some makers the use of the adjusting roller bearings has gained, a few concerns having placed it in the front road wheels as well as in certain parts of the rear axle. Frames have been made heavier by many concerns. The three-quarter elliptic spring has made progress on every hand, and its introduction has made it often necessary to drop the side members of the frame in front of the rear axle.

Packard—Reviewing the two Packards, one of which is the 30 in touring car, runabout, phaeton, close-coupled, limousine and landaulet form, and the 18, a touring car runabout, limousine and landaulet, one discovers that the two chassis are alike in design and construction. The 30 motor is continued as a four with 5-inch bore and 5½-inch stroke, and the 18 four with 4 7/16-inch bore and 5⅛-inch stroke. Probably the most noticeable mechanical improvement in Packard construction is the adoption of a new dry-plate clutch, the feature of which is the same action in cold as in warm weather. By an addition to the gear-shifting hand lever quadrant there is obtained a selective action in the same quadrant slot. As before the gearset is combined with the bevel-gear final drive and the differential, forming a rigid rear axle unit contained in an aluminum housing. All four Packard brakes act on the rear wheel brake drums, there being no application of braking power on the transmission. The Packard has stood pat on its carburation system, the carbureter being of the float-feed aspirating nozzle type with an auxiliary air inlet to keep

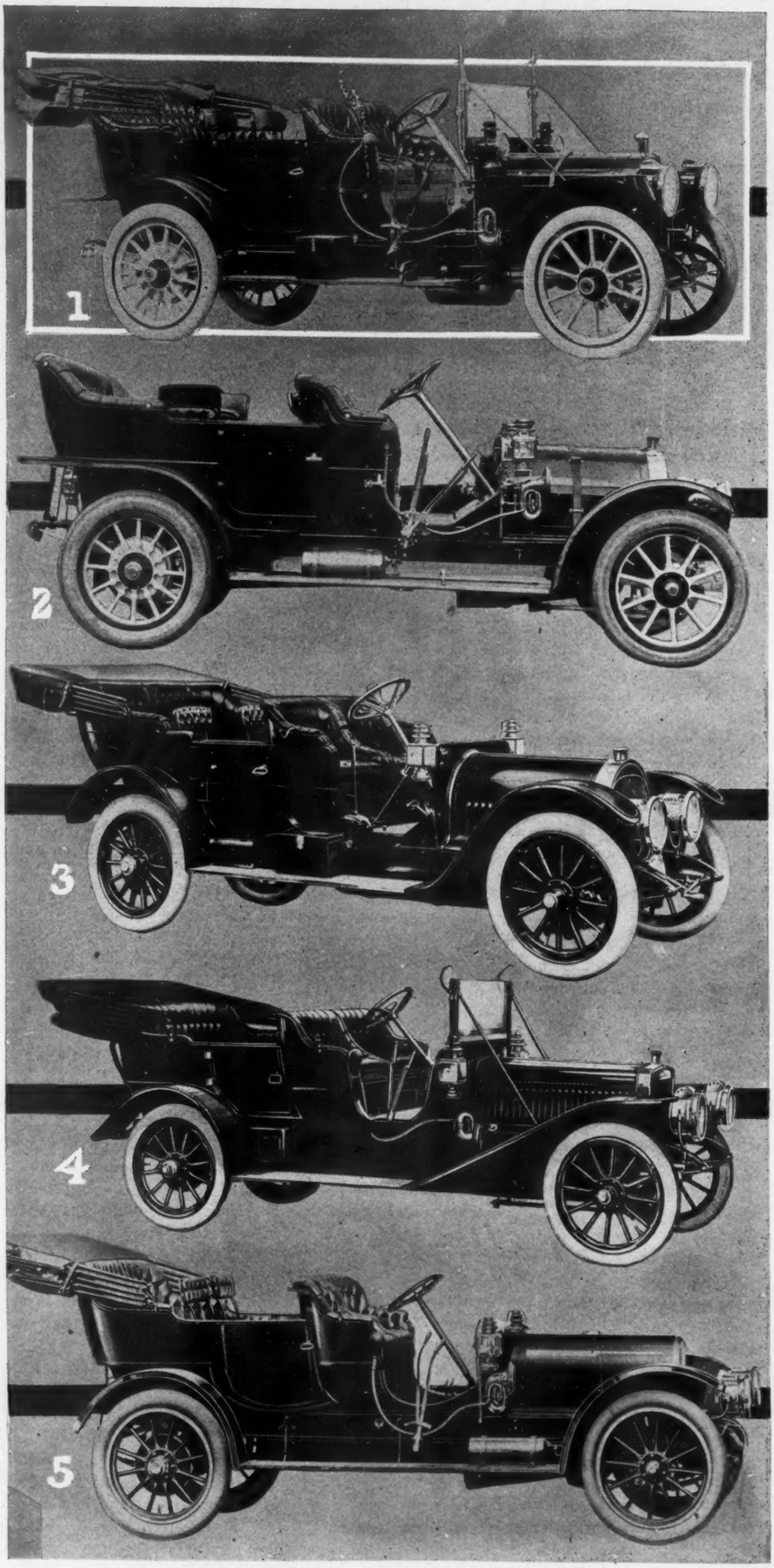
MAKES OF CARS

Alco
Apperson
Autocar
Brush
Buick
Cadillac
Columbia
Corbin
Chalmers-Detroit
Elmore
E-M-F
Flanders
Franklin
Glide
Haynes
Hewitt
Hudson
Jackson
Knox
Lambert
Locomobile
Lozier
Matheson
Maxwell
Mercer
Mitchell
Moline
Moon
Marmon
Marion
National
Oldsmobile
Overland
Packard
Palmer-Singer
Peerless
Pierce-Arrow
Pope-Hartford
Premier
Regal
Reo
Royal Tourist
Sampson
Selden
Simplex
Stearns
Stoddard-Dayton
Stevens-Duryea
Studebaker-Garford
Thomas
White
Winton

Touring Cars Designed for Big Parties

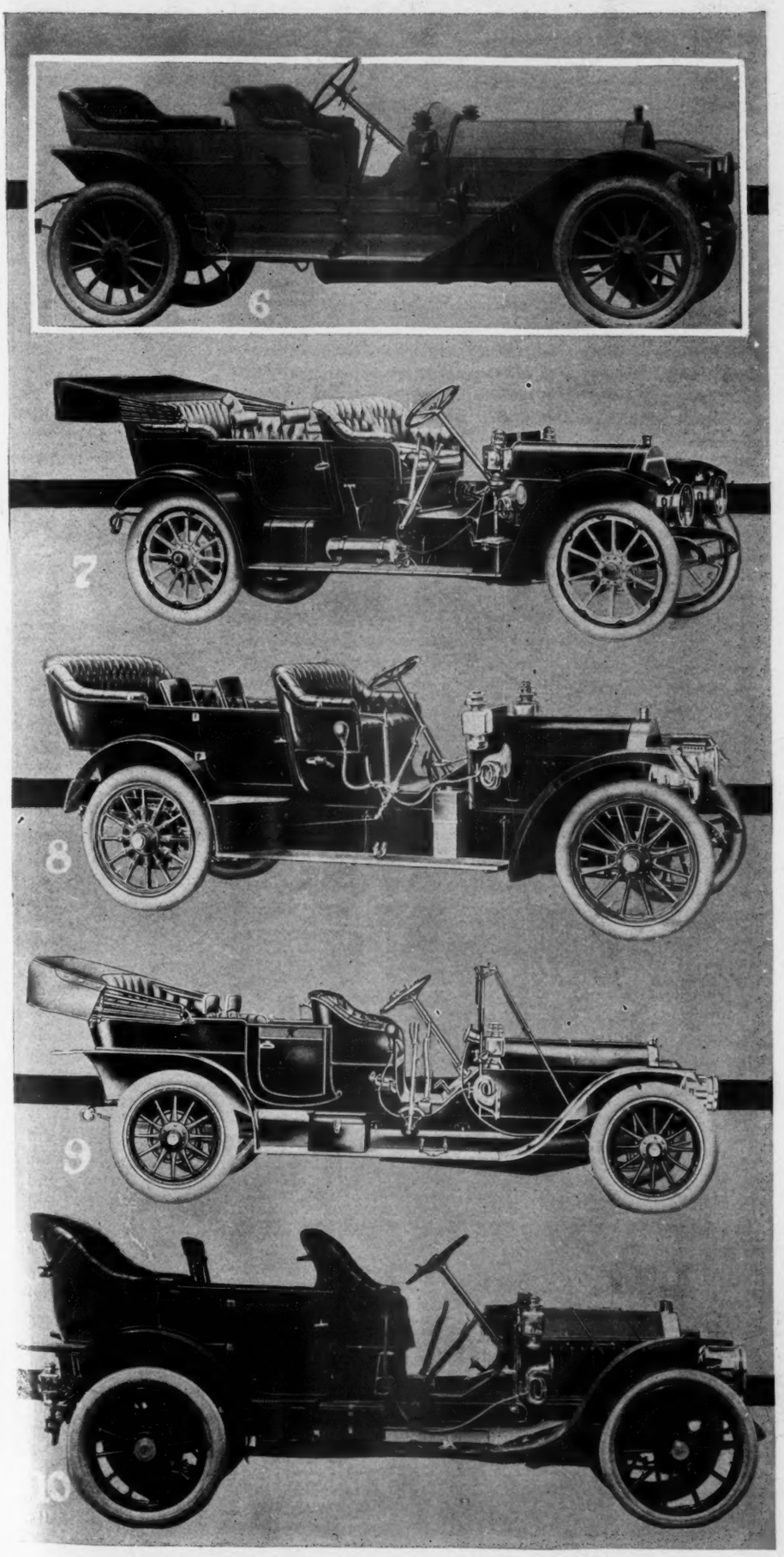
the mixture at correct proportion for all engine speeds and a warm waterjacket maintaining uniform temperature. As an aid to starting in cold weather there is a primary air intake shut-off. In the water system a change shows that the suction strainer in the pump is quickly removable for cleaning and the filler cap has a new type of fastening, which allows it to be quickly opened and closed and yet positively tightens it against leaking. The water circulation is positive by means of a gear-driven centrifugal pump. For 1910 the primary wiring in the ignition system, running from the battery to the coil box, is carried within a protecting tube, while the switch handle on the coil box is made in the form of a small lever, which is easily turned on either by hand or foot. The splash lubrication scheme involves an adjustable double-plunger pump, which feeds separately the front and rear compartments of the crankcase, oil being taken from a vertical copper reservoir located close to and between the cylinder pairs, while a hydraulic governor automatically regulates the motor speed. A refinement noted is the substitution of an automatic latch for the leather strap that formerly held the starting crank in place. Now there is a wood covering for the metal rim of the steering wheel, which also extends onto the spokes. The same design and construction are found in the running gear, where the main frame, made of channel section pressed steel, is arched above the rear axle to provide liberal spring action. Going to the body, the eye discovers that the front mud guards and aprons have been extended farther forward to increase the protection against mud thrown alongside the bonnet. Around the doors the moldings and framework have been made simpler and more attractive in appearance, while in the runabout body the rumble seat has been increased in size and depth and comfortably upholstered. All bodies are made of sheet aluminum panels over wood framework. The standard finish is Packard blue with cream yellow running gear.

Pierce-Arrow—Summed up the leading characteristics of the Pierce-Arrow for 1910 include twin-cylinder castings, longer wheelbases, larger sized tires, roller bearings for the road wheels, dropped frame, three-quarter elliptic springs, improved oiling arrangements, larger motor sizes and increased brake surfaces. As before only six-cylinder models are made ,there being three of them, the six-36, six-48 and six-66, which are all alike except in body, capacity, wheelbase and tires. Whereas the six-66 used individual castings last year, now it and the others as well use twin castings, while three-quarter elliptic



1—PACKARD; 2—THOMAS; 3—ROYAL TOURIST; 4—WINTON; 5—FRANKLIN

Models of Seven-Passenger Capacity

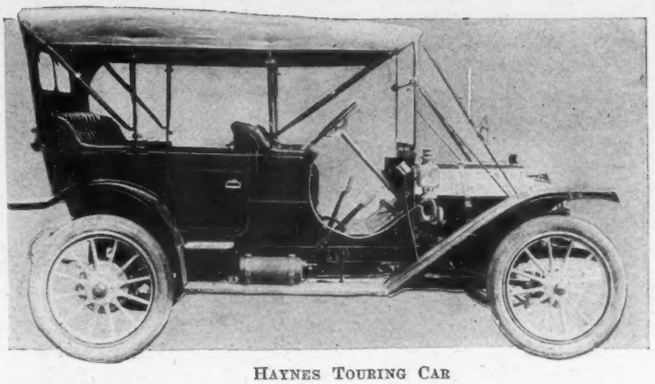


springs are used on all three instead of only on the six-36 as in 1909. Of course, this has necessitated the dropping of the side members of the frame and also to fit front springs with less arch. In the way of wheelbase the six-36 has been jumped from 119 to 125 inches, the six-48 from 130 to 134.5, and the six-66 from 135 to 140. To accommodate these increased lengths heavier flanges are fitted to the I-beam front axles, which are an inverted arch and entirely free from any sharp angles. Instead of annular ball bearings in the front wheels at the outer ends of the rear axle driveshafts there are fitted short-series Timken roller bearings. The six-36 shows an increase in bore from $3\frac{15}{16}$ inches to 4 inches, but the stroke remains the same, $4\frac{3}{4}$ inches. The six-48 has the same $4\frac{1}{2}$ by $4\frac{3}{4}$-inch bore and stroke, while the big Pierce has been jumped from 5 to $5\frac{1}{4}$-inch bore, but with the same $5\frac{1}{2}$-inch stroke. Noted in the oiling system is a peculiarly-shaped oil groove which is turned in the piston near its bottom and which groove has a right-angled corner at the top and then tapers gradually at the lower side. The idea of this is to remove oil from the cylinder walls rather than carry it into them. Excess of oil in the cylinders is avoided by the fitting of a baffle plate at the bottom of each cylinder and an opening through which the connecting rod works. This oil groove also regulates the amount of oil on the cylinder walls. Another change that will be appreciated by the driver is the fitting of a Spencer power air pump for the purpose of inflating the tires, the two-cylinder pump being driven from a bronze pinion which is mounted on the pumpshaft. Casting the cylinders in pairs has not caused the Pierce to abandon the idea of using seven bearings in its motor, whereas it is the general custom to use only four bearings when this is done. Also new is the use of a master vibrator Autocoil and battery system in the ignition scheme, while the major ignition system consists of a Bosch magneto with separate set of plugs. In improving the transmission the gearset housing has been slightly raised in all three models, and the gearshaft lever has been lengthened 2 inches. There is an increase in the braking diameter, while the running boards have been made 2 inches wider and a sheet metal apron placed between them and the under side of the frame. The new mudguard has a forward fender and a straight-slope one in the rear. The adoption of the hollow dash for the six-36 makes this type uniform in the line.

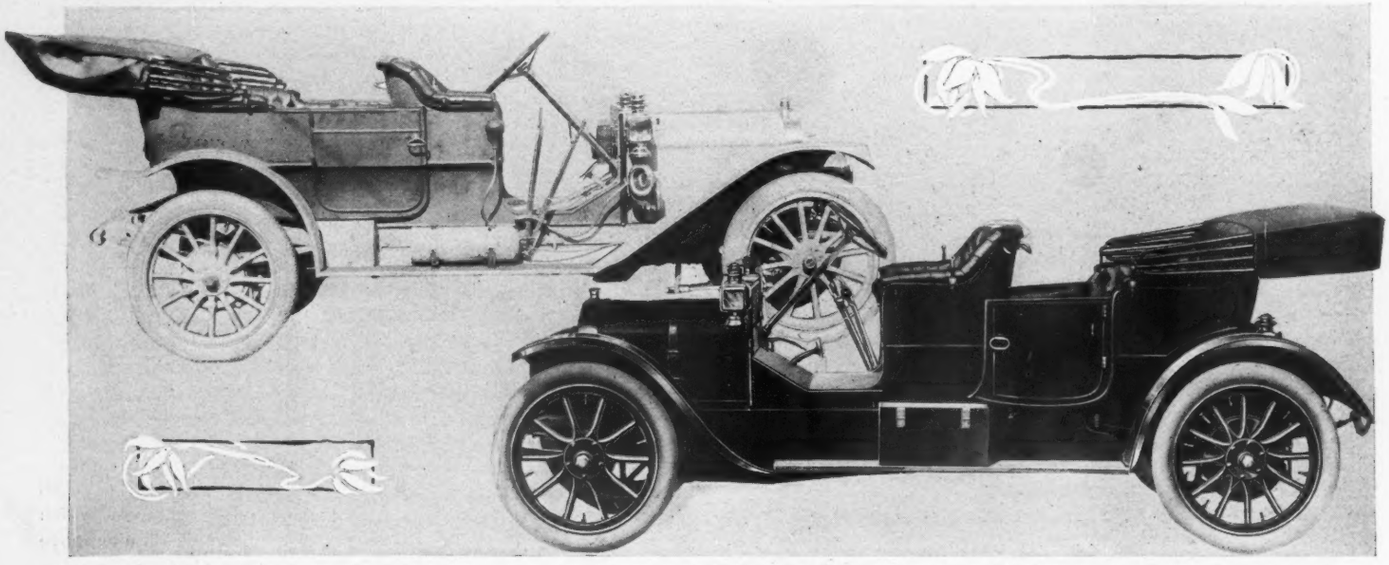
Peerless—Retaining both the four-cylinder and the six, which are alike in design and using the same cylinder castings with

6—Pierce-Arrow; 7—Stearns; 8—Locomobile; 9—Knox six; 10—Peerless

a bore of 4⅞ inches and a stroke of 5½ inches, the Peerless comes out with practically the same body lines but with the speed-change and emergency brake levers slightly in advance of last year's fashion, which has been brought about by supporting the transmission set from 6 to 8 inches nearer the front on the frame and bringing it well under the front floor boards, increasing the accessibility. But in other places it is noted where the designer has been busy. A new carbureter is placed low on the crankcase, which insures a positive gravity gasoline flow irrespective of the grade. The intake manifold is a Y with a waterjacketed stem running its full length and with the auxiliary valve under spring control, located in the angle between the pipes going to the front and rear castings. A metal float still is used by the Peerless in the carbureter, while the venturi-shaped strangling tube has in its base a vertical



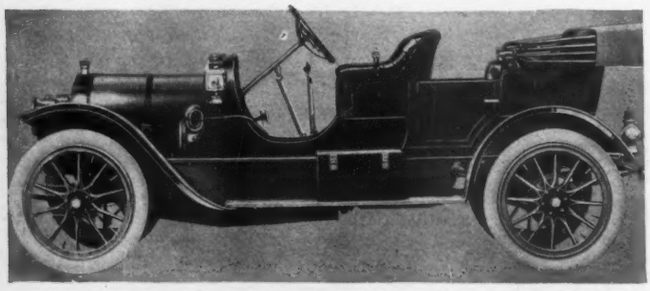
HAYNES TOURING CAR



TOP—CORBIN TOURING CAR WITH FULL EQUIPMENT

BOTTOM—WHITE'S IDEA OF A GASOLINE TOURING CAR

spraying nozzle. All throttle and spark connections are of the ball-and-socket type, which has replaced the clevis or yoke type. The bank of five pumps for the oiling system is now located in the oil reservoir instead of on the dash, the oil reservoir being placed at the left rear of the motor. This leaves only the five sight feeds on the dash. At the base of each part of the crankcase is a drain cock by which it is possible to drain the oil from the crankcase without getting dirty. In the ignition system the high-tension has replaced the low-tension type formerly used, which eliminates the dash coil. All the high-tension wires are enclosed in a tubing which curves downward at its forward end. In the cooling system spiral gears are used to transfer the power from the vertical shaft and from this shaft to the fan hub, while the gear-driven fan remains. The one-piece construction has been introduced in the gearbox and also is used in the cast steel housing for the differential in the rear axle, which housing is split 2½ inches above the axle line instead of in the middle line as heretofore. This permits of the tapered axle sleeves bolting direct to this casting. The axle housing, a three-part affair, consists of a one-piece cast steel differential housing and two bell-shaped sleeves, which are forgings drilled at the ends to take the axle driveshafts, and which are hollowed at the fluting ends, where integral flanges are formed by which these forgings are bolted to the differential castings. In the running gear the front semi-elliptic springs are 2 inches longer and the side members of the rear platform springs have been increased 4 inches. This does not increase the wheelbase, being nearly taken up by the bracket which supports the center of the rear cross spring on the frame. Tires on the rear are 5½ instead of 5, while the gasoline tank has been increased in capacity from 17 to 22 gallons.

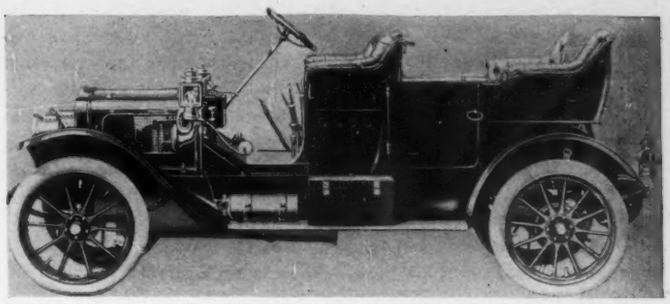


ANOTHER VIEW OF WHITE GASOLINE CAR

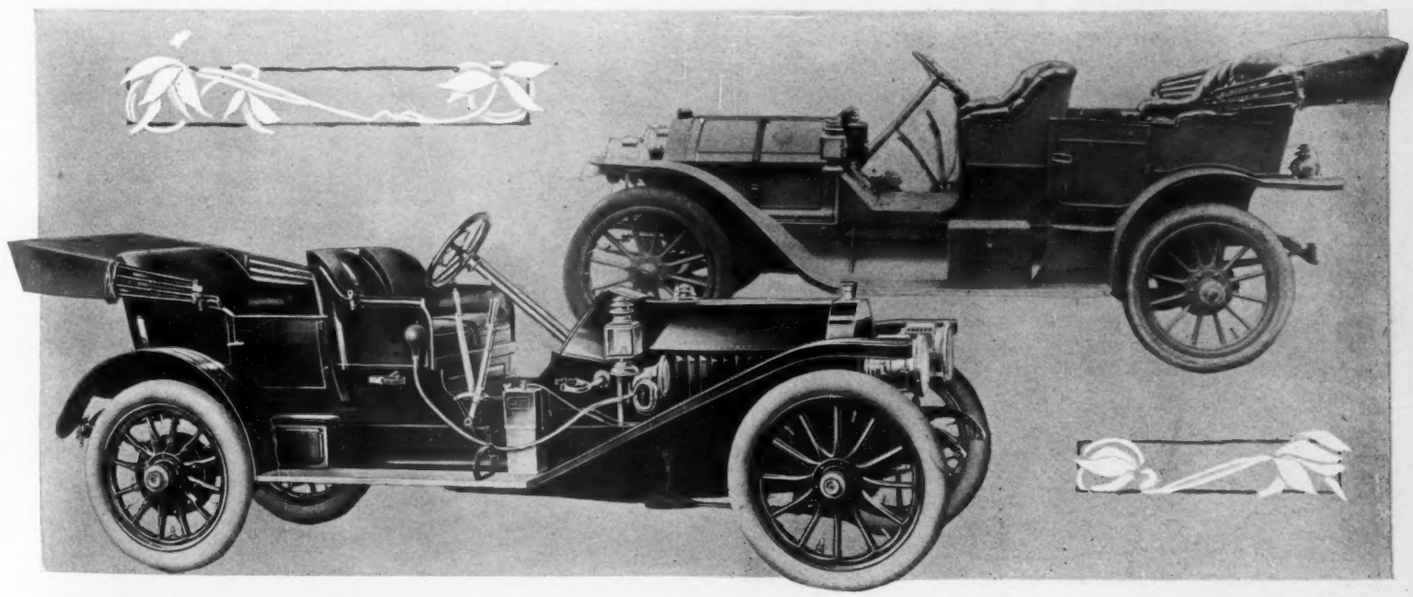
Locomobile—The Locomobile line for 1910 remains practically unchanged with the exception of a few improvements in regard to several mechanical details and the general refinement of the product. In the motor the timing gears are now of the spiral type instead of the straight spur gears previously employed; and with the exception of a change in the type of mechanical oiler used there are no further changes. All other mechanical features of the car also remain the same except for an improvement in the torque rod support of the shaft-driven cars, the adoption of external and internal brakes instead of the double internal brakes previously used, and a refinement of the brake-adjustment mechanism. Aside from the features above mentioned the general characteristics of the Locomobile cars are similar in every respect. In the model L 30-horsepower motor the valves are located on opposite sides, camshafts are one-piece drop forgings with integral cams, and the intake shaft carries the igniter cams of the make-and-break mechanism, which have a taper face so that by sliding the entire camshaft endwise the spark may be advanced or retarded. The crankcase is of cast bronze, with its

lower removable portion of aluminum. The train of gears operating the valves, pump and ignition is inclosed and runs in oil. A waterjacketed carbureter of Locomobile design is fitted, ignition is make-and-break, and the cooling system is comprised of a centrifugal pump, a honeycomb radiator and an adjustable belt-driven fan. Lubrication is by means of a mechanical oiler, which forces the oil direct to the crankcase, bearings and timing gears. Transmission from the motor is through a leather-faced cone clutch with springs under the leather to facilitate smooth engagement; the gearset is of the selective type, four speeds forward and one reverse, with but two sliding members, and is equipped with annular ball bearings. The gearcase is of the same construction as the crankcase, manganese bronze with an aluminum lower portion. In the running gear the frame is of pressed alloy steel, heat-treated of channel section, raised above the rear axle and narrowed in front to reduce the turning radius. The front axle is of I-beam section; while the rear axle, of the full-floating type, consists of a steel housing, with heavy tapering steel tubes forced into openings on each side, riveted into place, and braced with an adjustable strut rod. Radius or distance rods similar to those on the chain-driven cars maintain a parallel between the front and rear axles, and these rods carry the brakes so that the rear axle is relieved of all driving and braking strains. The rear springs have shackles at both ends and their only duty is to carry the load. The dogs or jaw clutches of the axle driveshafts are integral with the shafts, and imported annular ball bearings are used throughout the gearcase and driving mechanism.

Thomas—Having become convinced that the long-stroke motor is one of the best forms of engine construction, the E. R. Thomas Motor Car Co. continues its use in 1910, the Thomas line showing very few changes. In the case of F. and K., the two large cars, it takes a discriminating eye indeed to see any difference, but in the little six and town car it is easy to pick out where the designer has refined his product. With this long-stroke engine, large gas passages and valves one-half the size the cylinders, the Thomas people have an engine which they regard as remarkable because of its flexibility. It also is evident that the waterjacketing has been given considerable attention, for every possible portion of the cylinder walls and valve chambers has been jacketed and the circulation so arranged that the coldest water comes where the metal is hottest. Not only is the waterjacketing the feature of the cooling system but the centrifugal pump used is a miniature reproduction of the type used in the large hydraulic work. Also there are a belt-driven fan of cast aluminum and a honeycomb radiator fitted. The valve clearance has been reduced to .004 of an inch while in its efforts to save weight and yet retain strength the Thomas company has produced a transmission which weighs only 82 pounds, in which the gears are of nickel steel and run on annual ball bearings, the transmission being connected with the motor through two joints

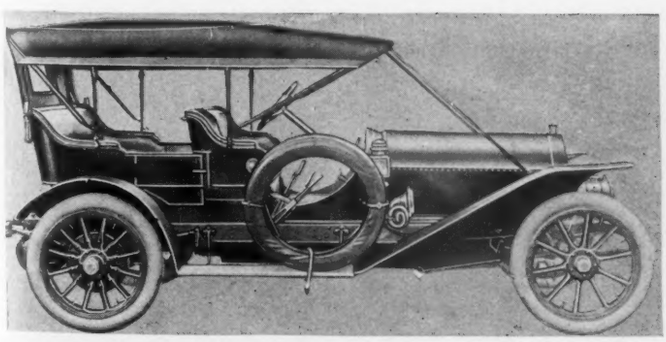


WHITE STEAMER FOR 1910 USE



TOP—APPERSON IN TOURING CAR FORM

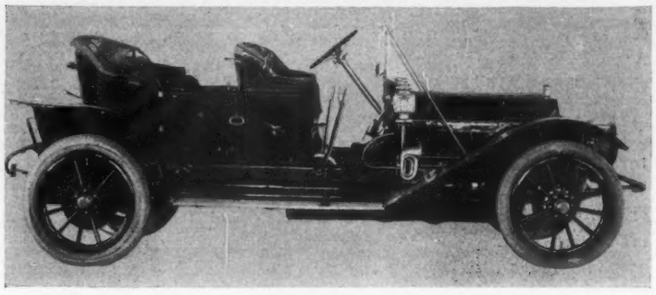
BOTTOM—THE LOCOMOBILE



PALMER & SINGER TOURING CAR

of the internal gear type by the Thomas three-disk clutch which has been improved by the addition of cork inserts and a double adjustment. These changes have been made in the model M or little six, and the larger types are made the same with the exception that the front fender now makes a curve downward instead of running out straight, and the size of the front sprocket housing has been reduced. Returning to the model M with its long stroke motor and larger gas passages, it also is noted that a change in metal has been made in the flywheel which now is of steel instead of cast iron. Probably the most startling departure in this engine is the fact that the cylinders now are cast in pairs instead of in groups of three, as was the case in 1909. The valves, however, are on opposite sides, just as before, the valves themselves being one-half the diameter of

the cylinders, the actual diameter of the opening being 2⅛ inches while the valves measure 2⅛ inches across the head. In this connection it is noted that the Thomas people have provided the plungers with fiber inserts and have reduced the valve clearance about 50 per cent because of more accurate workmanship, all of which tends to reduce the valve noise to a minimum. The connecting rods are extra long, 11¾ inches, which is ¾ inch longer than the usual length of connecting rods. The feature of the crankshaft, which is supported on four plain bearings, is that the total projected bearing area is 52.6 square inches, which is about 30 per cent greater than ordinary practice. Die-cast bushings made of babbit are used on the crankshaft and on the big ends of the connecting rods. The wheelbase is longer, now showing 125 inches, while more clearance is provided, there being 12 inches in front and 11½ in the rear. Another change has been to place the transmission amidships instead of on the rear axle, while the rear axle casing itself is of one-piece design. Another Thomas change has been to fit larger tires, there now being 36 by 4½-inch pneumatics all around except on limousines and landaulets, which carry 37 by 5. Among the other changes reported are ball-and-socket joints on the control mechanism, larger brakes, larger frame, full floating type of axle, cast aluminum belt-driven fan, and larger radiator. The town car chassis is very similar to that of the little six with the exception of the motor, which has four cylinders, and the wheelbase is 2 inches shorter. Probably the most startling difference in this type is found in the body design, three new designs being offered in brougham, limousine and landaulet form.

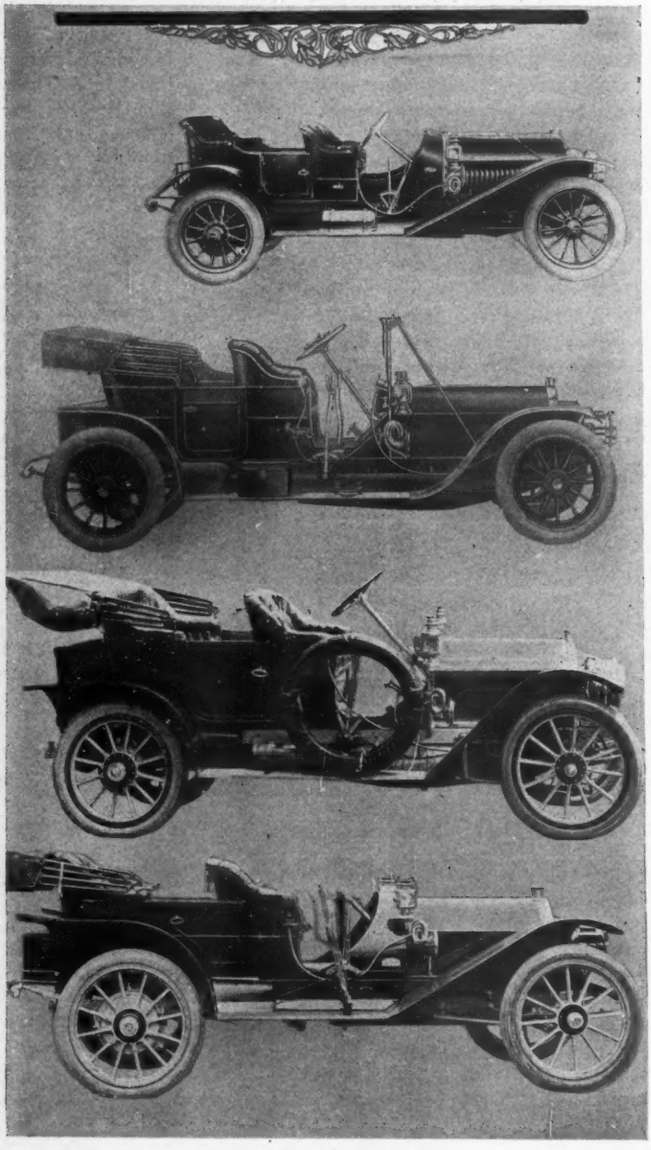


PIERCE-ARROW CLOSE-COUPLED 48-HORSEPOWER SIX

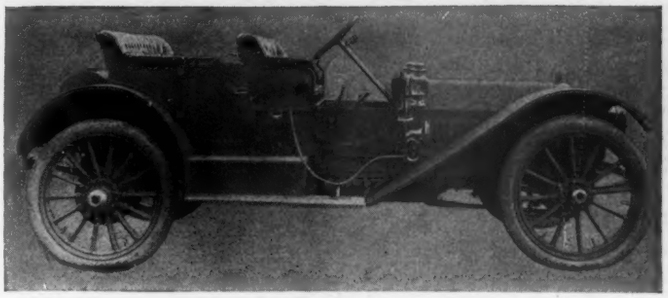
Royal Tourist—The Royal Tourist continues its practice of making only one chassis upon which are mounted different styles of bodies, the purchaser being given his choice of a touring car and an enclosed model, a close-coupled car, a semi-racer and one of the torpedo patterns. This one model is designated M series II, which is a continuation of series I with, of course, some few revisions. The motor continues to be of the four-cylinder type with a 5½-inch bore and 6-inch stroke, developing 48.4 horsepower, and with the cylinders cast in pairs integral with the waterjacket, the valves being placed on opposite sides. There is a longer hood on the new model, while a square dash has been adopted. There has been an improvement made in the carbureter, which is of the venturi-tube type, while the Royal Tourist people continue to use their oiling system for which remarkable economy is claimed. In this system the oil supply is carried underneath the pan of the motor and is pumped up by means of a small rotary gear pump so a constant level is maintained in all four compartments of the crankcase, independent of the angle at which the motor may be set in relation to the horizontal line. This pump also supplies the connecting rod bearings and wristpin bearing, and there also is an overflow which sprays oil on the time gears and magneto gears, the oil being used over and over again by means of the filtration scheme. Changes made in the motor have been the simplification in the ignition and lubrication schemes and the abandonment of the self-starter which was fitted to the first few models brought out a year ago. The Bosch ignition system has been adopted and, as mentioned above, the lubrication system has been redesigned. The rear axle is of the floating type of construction, while the axle housing is a four-piece affair. Cork inserts have been introduced into the clutch which also has a wider engagement spring while heavy radius rods transmit the driving power. Four instead of five brakes are used, the contracting band brake acting on the transmission shaft in the rear of the gear box having been discontinued. In the frame the side members have been dropped in front of the rear axle.

Winton—Well satisfied with having stuck to the six-cylinder, the Winton company is making its bids for the 1910 business with a motor which is the same now as it was a year ago—a 48-horsepower engine with a bore of 4½ inches and a stroke of 5, low hung, with all moving parts except the flywheel enclosed and with the cylinders cast in pairs, with a waterjacket completely surrounding each individual cylinder. However, the house of Winton has not been content to rest on its oars and, while the engine remains the same, the result of the year's development in motor car construction is shown in the refinements of the 1910 product. The multiple-disk clutch, for instance, is 50 per cent larger in diameter than it was last year, and a slight foot pressure operates it because of its four springs. A fourth speed has been added to the selective gearset, while there also is a new carbureter. A shorter turning radius is had by end-sweeping the frame in front, while in the spring system the semi-elliptics have

Several 1910 Body Types



ALCO, AMERICAN LOCOMOTIVE CO. PRODUCT
ADDITION TO KNOX GROUP, THE SIX
STUDEBAKER-GARFORD READY FOR THE ROAD
STEVENS-DURYEA IN THE FOUR-CYLINDER TYPE



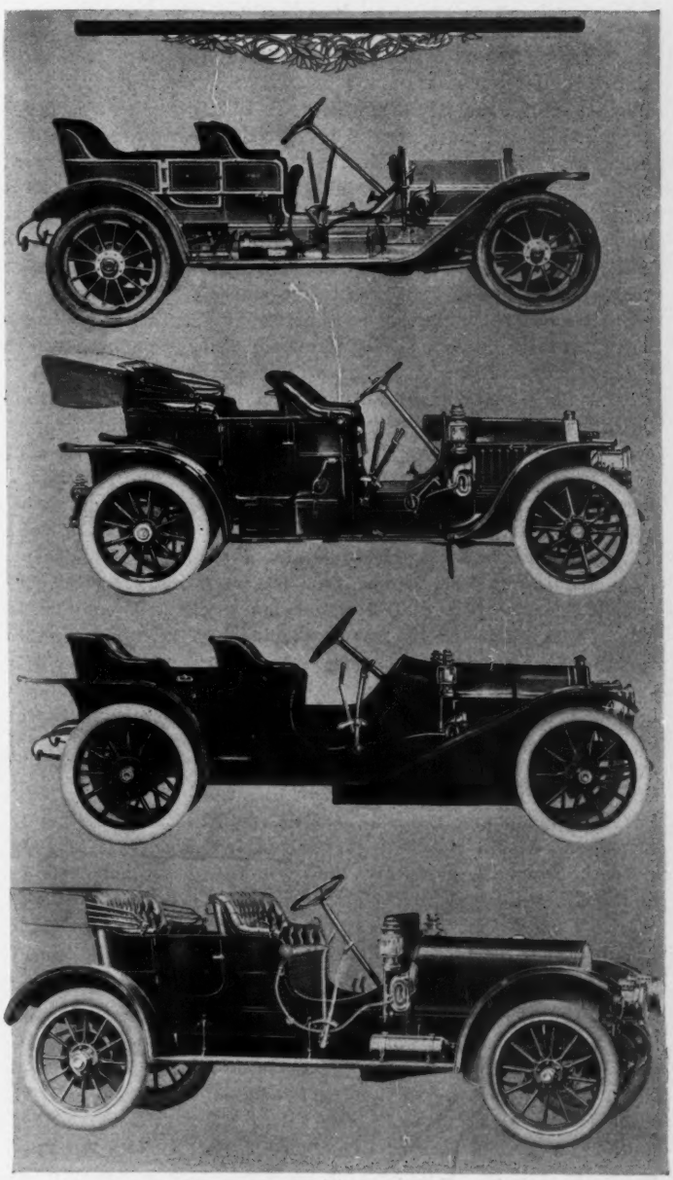
OLDSMOBILE LIMITED SIX-CYLINDER

been increased in size to permit of a low suspension of the body, while four shock absorbers and four rubber bumpers also are utilized. The body is longer and wider, made possible by increasing the wheelbase 4 inches, bringing it to 104 inches, while the forward seats are of the bucket type. The front axle is of channel-section pressed steel, while other refinements are the widening of the runningboard and guards, the rear guards dropping over the wheels, while the runningboard and front guards are covered with pressed aluminum. A hasty glance over the car in its new dress also shows a new design of radiator with longer tubes, longer filler and hard-rubber cap; hard rubber steering-wheel rim, longer spark and throttle levers on the steering column, increased brake leverage, carbureter primer on the dash, dual ignition, etc. Of course the Winton people have stuck to their self-starter, which has been used for 2 years and which is generally familiar to motorists throughout the country. Also the car continues to be equipped with a mechanical tire inflator, while another useful idea is found in the brake-lever segment, in which is drilled a hole to receive a padlock. When the lever is drawn past this hole and the padlock inserted, the clutch is out and the brake applied, which protects the car against theft. The Winton carbureter has a single nozzle and a double throttle, the latter operating in combination. The carbureter has no automatic air valve, is placed on the opposite side from valves, and is throttled mechanically by a lever from the steering column or a foot button at the driver's right foot; there is also a carbureter primer on the dash. The change noted in the frame shows side rails inswept in front, with the rail 120 inches in length, 4 inches longer than before. The side rails and drop members are of one-piece channel-section pressed steel, and the motor, clutch and transmission are carried on drop frame, there being no sub-frame.

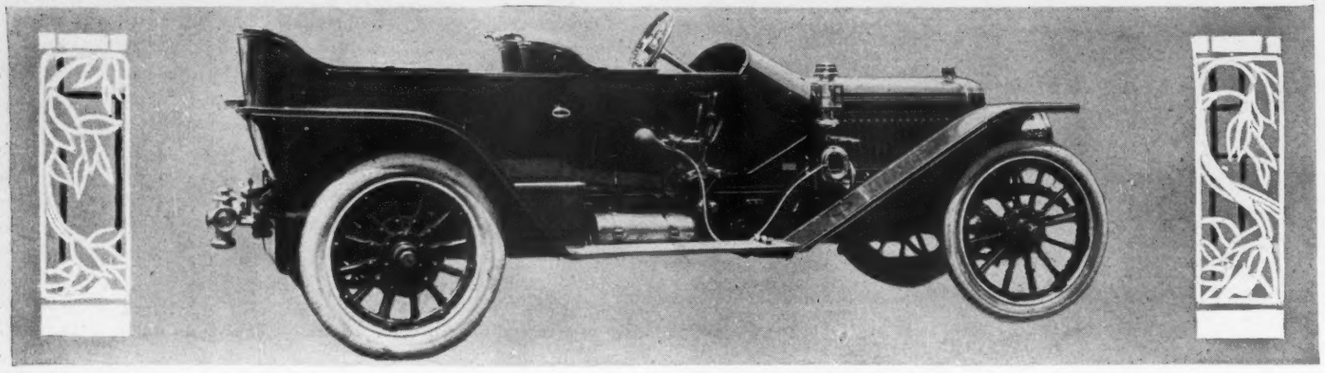
Matheson—The Matheson car is exhibited in two types, namely, four and six-cylinder designs. The four-cylinder Matheson is practically the same as that marketed in 1908 and 1909 and is characterized by a four-cylinder motor with valves in the head and using make-and-break ignition. The transmission system incorporates multiple-disk clutch, selective gears mounted amidship and chain drive. As in 1909, so in 1910 the Matheson leader will be the six cylinder car, which was brought out a year ago and which has been considerably refined for the coming season. This car possesses as its leading characteristic cylinders cast in pairs with valves in the head and a combined transmission and rear axle. This motor uses a jump spark ignition system. By way of improvements the company has added a new universal joint in the propellor shaft and the multiple disk clutch has been altered, so that now the disks at the flywheel end of the set are supported on a carrier rather than direct on the flywheel. The noise of valve action has been reduced by careful machining of the camshaft, so that now but 5/1000 allowance is permitted between the end of the tappet rods in place of 18/1000 this year. In the motor the timing gears are of helical design, whereas they were of the spur type, a change which is intended to reduce noise. Cast-iron gears are used on the camshaft and hardened steel on the crankshaft. A slight alteration has been brought about in that the magneto and water pump are moved forward slightly. In other respects this car is little altered. The rear springs of the three-quarter elliptic type are longer than heretofore, but no change has been made in the frame, rear axle and transmission parts. This motor for the coming season is fitted with touring, toy tonneau, roadster, torpedo, limousine and landaulet bodies. Particular rigidity of construction enters into the make-up of the chassis frame, which is dropped in front of the rear axle to lower the body carriage. The side members are made with considerably widened channel lips where they are brought together bottle-neck fashion at the dash. Just in rear of the clutch housing is a heavy cross member which supports the forward end of the torsion tube, and this member is reënforced by long channel braces from the side members to the center of the crosspiece. Similar brace members are used at the rear. The front axle, of I-beam design, is straight between the spring seatings instead of being dropped, as is so common in most cars. The combined rear axle and transmission design is conventional, and accessibility is furnished in that the complete cover for both may be removed, at which time the complete set is disclosed. Internal and external brakes are furnished on the rear wheels, both seats being operated through equalizers.

Haynes—The new Haynes for 1910 differs largely from previous models in that many of the original Haynes characteristics have been dropped. The double flywheel, the roller pinion drive in the rear axle, the one-piece driveshaft in the rear axle, the

Some Close-Coupled Ideas



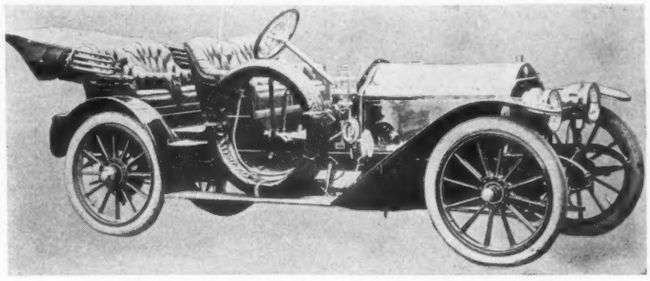
STEARNS IN ITS NEW DRESS FOR 1910
PEERLESS MODEL 27 EQUIPPED WITH TOP
CHALMERS 40 WITH NEAT AND ATTRACTIVE LINES
RANGY-LOOKING AIR-COOLED FRANKLIN



LOZIER CHASSIS FITTED WITH DESIGN OF TORPEDO BODY

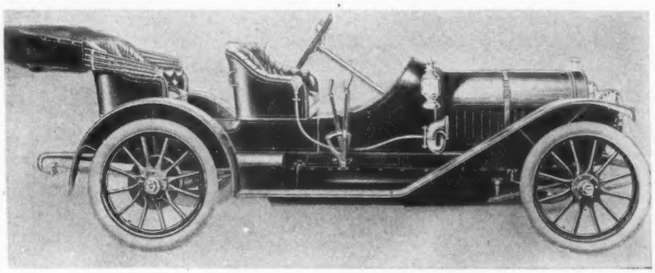
ratchet pinion of the transmission, and the Haynes patent torsion device all have gone by the board. The new car is standard construction in practically every respect, and is but one more example of that gradual converging of all manufacturing effort to an inevitable standard. The motor, transmission, and steering gear in this year's model are assembled as a unit; the straight frame of last year has been abandoned for one of the conventional type with a 2-inch drop in front of the rear axle; the change gear levers operate in an H quadrant, wherein last year a spring shift lever without a gate was used. The 1910 model is smaller in size and horsepower than the 1909 model, but in proportion to its size it is far more powerful, a conditin which has been brought about through general reconstruction and refinement. In proportion to the size of the car, the bodies for 1910 also are more commodious and comfortable than any hitherto used, and a vast improvement has been made in their appearance by the adoption of a straight-line design with convexed backs. In the motor the bore and stroke now are 4¼ by 5 inches, whereas last year they were 4⅞ by 5 inches respectively. The valves have been reduced in proportion so that they measure $2\frac{5}{16}$ instead of 2⅝ inches in diameter; an improvement has been made in the pushrod mechanism which adds to their wearing qualities. Spiral steel timing gears are fitted in place of the fiber and bronze gears previously used; a gear pump has been substituted for the eccentric sliding-leaf vain pump previously used; a Stromberg carbureter and a Splitdorf magneto are now employed, and an improved self-contained circulating lubrication system with a sight feed on the dash adds greatly to the efficiency of the motor. The crankcase is a two-piece aluminum casting, the lower portion carrying the oil reservoir of the new oiling system. Between the reservoir and flywheel is a gear oil pump which elevates the oil to the crankshaft bearings. The drop from these furnishes the splash, and baffle plates across the open cylinder ends prevent an excess of oil reaching the cylinder walls. Two innovations appear in the cooling system, the first being the use of a gear water pump beneath which is a sediment chamber containing a wire gauze cone, which is designed to prevent foreign substances from entering and damaging the gears of the pump. Both the pump and the Splitdorf magneto are driven from the same gear within the timing gear housing, but there is a jaw clutch between the pump and the magneto. The other change is in the bracket supporting the fan, which is attached at the top of the timing gear housing and may be moved to the right or left to adjust the tension of the fan belt.

Apperson—There are no radical changes in the Apperson line for 1910, but a number of refinements and a few improvements have been made. The general appearance of the car has been greatly enhanced by changing the shape of the radiator and hood and adopting a straight line type of body construction. The space between the running boards is all enclosed on the 1910 models. A walnut dash of simple square design has been fitted. The tonneau of the car is roomier, the headlights have been raised to give better and more extended reflection, and the tail lamp is now located over the left rear fender, where it is shielded from dirt and dust and where it may be most readily seen. The motor and transmission remain the same in construction, but new departure ball bearings have been fitted throughout the transmission, rear axles and wheels. These bearings are of a standard size and are made with a double row of balls which make the bearings extremely strong as regards end thrust. The rear axle on all Apperson models is changed from a full to a semi-floating type. The brakes also are enlarged and tools are carried in a neat metal box situated on the running-board opposite the front seats. Of the eight models which comprise the Apperson line for 1910



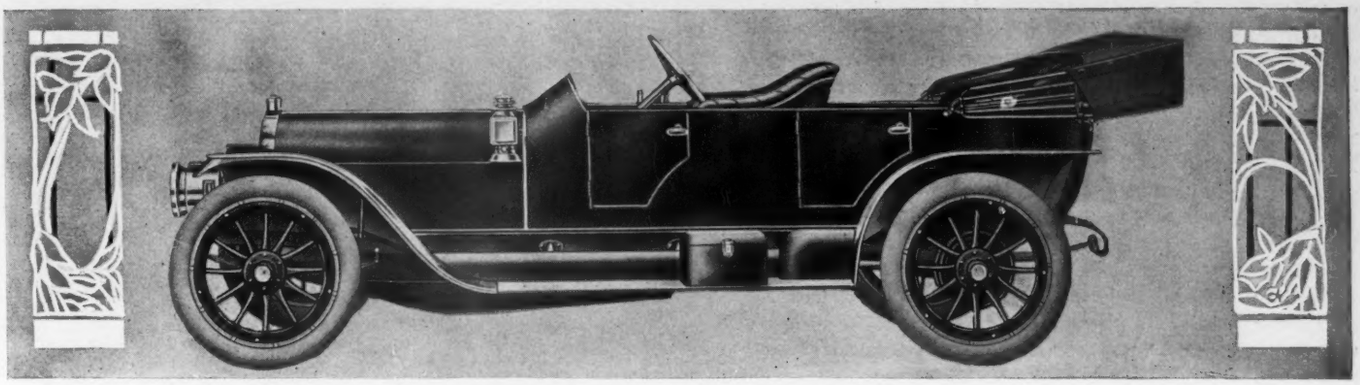
STUDEBAKER-GARFORD FOUR-PASSENGER SURREY

two of them are practically new, but all models are built along the same mechanical lines, the only difference being in dimensions. The cylinders are of the T type with the waterjackets cast integral, a vertical type radiator of distinctly Apperson construction, a sliding vein pump operating off the forward end of the left camshaft, and a belt-driven fan, are features of the cooling system; a double ignition system with a Bosch high-tension magneto as the mechanical source of current is used with two separate sets of spark plugs. The oiling of the motor is accomplished through a force feed oiler, located on the engine crank-



THE 1910 POPE-HARTFORD SURREY

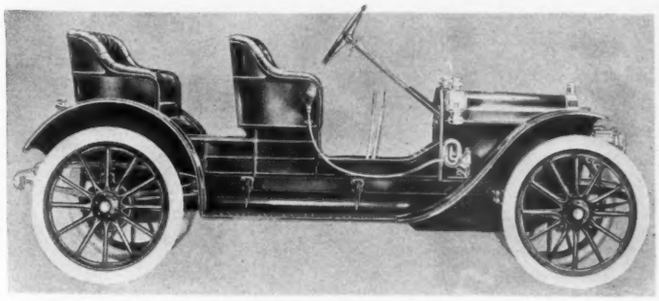
case, and gear driven from the magneto shaft. The clutch used on the Apperson cars is commonly known as a contracting band type. It was invented and patented by the Haynes-Apperson company in the early '90's and has been in constant use on these cars since its invention. The gearset is of the selective sliding gear type with three speeds forward and reverse, and transmission to the rear axle is by means of shaft in all except the Jackrabbit models, in which double side chains are employed. To sum it all up, the whole change in the Apperson line for the



KNOX TORPEDO WITH HEAVILY HOODED DASH AND TOP

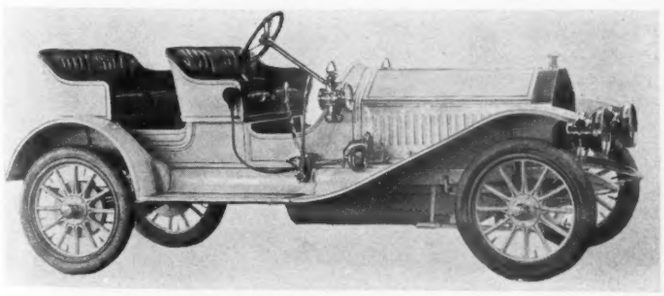
season of 1910 is due to a few minor refinements which add to the general efficiency and appearance of the product.

Studebaker-Garford—Succeeding the model D Studebaker-Garford 40 is the G-7, which comes with several types of bodies and which is the same as the 1909 offering with the exception of a very few changes in minor details, such as the transmission, steering gear and in the lubrication and drive system. The motor still continues to show its cylinders cast in pairs and with opposite valves, the bore being 4¾ inches and the stroke 5¼, while



FLANDERS FOUR-PASSENGER SURREY

the waterjackets and valve chambers are integral with the casting proper. The Bosch magnetic plugs, which give a low-tension make-and-break spark, are retained. The lubrication system shows that a Lavigne multi-feed oiler is located on a bracket over the flywheel and gear-driven from a spur gear from the end of the camshaft. In order to prevent the flywheel from throwing up any overflow of oil there is a metal shield which covers the top of the flywheel. The cooling system employs a centrifugal pump, which is placed on the crankcase at the left side, and the fan is



BUICK FOUR-PASSENGER SURREY

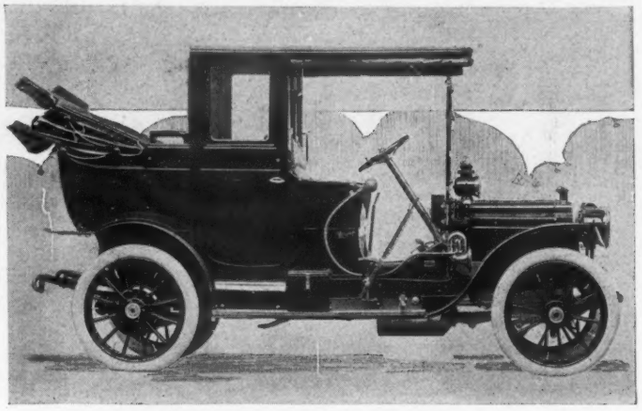
mounted back of the radiator, a slight change from last year, where it is placed on a hollow standard which rests on the crankcase. The carbureter used differs from the old one and is of the separate float-feed type with auxiliary air valves, establishing an automatic regulation of the flow of gasoline through the spray and nozzle. Both main and countershafts in the gearset are on the vertical plane with the main shaft on top, the gears being housed in a one-piece aluminum casting, which is carried in the rear of the clutch on a three-point support on the sub-frame members. The four-speed selective transmission gives direct on third speed, and fourth speed is faster than direct. The side frame members continue to arch above the rear axle, and the springing employs semi-elliptics in the front and a platform suspension in the rear, the cross members of which anchor to a bracket extending rearward on the back crosspiece of the frame. The wheelbase is the same, 118 inches, and the wheels are 36 inches in diameter with 4¼-inch tires used in the rear and 4-inch in the front. A minor change in the chassis flooring is the employment of wood in the front board and toeboard instead of aluminum. There are three bodies—a runabout, tourabout and seven-passenger touring car, the last named employing gravity feed in the gasoline system and the others using pressure feed.

Franklin—It is doubtful if any other concern exhibiting in the garden has a larger line than the one exhibited by the Franklin company, whose air-cooled output for 1910 will number sixteen models, three of which are touring cars, the two larger of which have either a regular full size touring body or miniature tonneau, and five runabouts in the open cars and three limousine and landaulets and town cars and taxicab among the closed cars. The Franklin still sticks to the air-cooling principle, but this system has been greatly simplified and its efficiency increased for the new year. Easy riding qualities also are sought and these are secured, it is thought, by the use of four full elliptic springs and laminated wood chassis frames. It is the engine that has received the greatest attention at the hands of the designers and here it is that a new method of employing the cooling air current to the cylinders has been employed. In the Franklin, as the general public knows, each of the cylinders had been encircled by a series of horizontal metal flanges of phosphor bronze shrunk under the exterior walls and greatly magnifying the exterior or heat-radiating surface of the cylinders. The change for 1910 comes in making these flanges vertical instead of horizontal, the flanges being steel and cast into the cylinder body instead of being shrunk onto it. The gear-driven fan in the front of the hood no longer is part of the Franklin equipment because of this change. Surrounding each cylinder is a cylindrical sleeve of sheet metal, and through this funnel-like opening a strong current of air is drawn from top to bottom by a suction flywheel at the rear of the engine base. The entire engine base is given a housing of sheet metal in order that the necessary suction of the cylinder enclosures to the fan may be effected. The top of this forms a deck extending from the funnel cylinder casing to the side member of the chassis frame, and this, with a pan below the engine, forms a chamber in which the air pressure is made by the flywheel and kept less than atmospheric, this producing the partial vacuum necessary for the introduction of the air current from above. After the air has performed its cooling functions it is exited from the rear of the engine base and driven out from the sides of the fan. It is claimed for this system that the air is equally divided among the cylinders, is of equal temperature and is equally cooled. The whole combination increased the cooling efficiency and also the motor efficiency. Each of the cylinders is cast separately and each has the same number of pins or flanges. To many this new engine will be strange in that it differs from the old in that the entire motor, with the exception

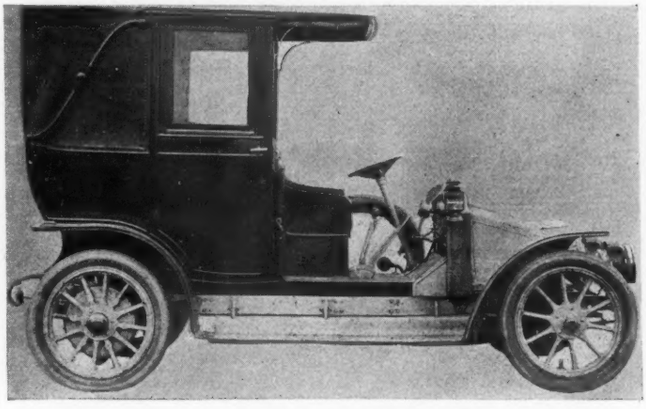
of the cylinder heads, is enclosed in sheet metal in order that the suction producing the cooling current may be obtained. Old friends such as the auxiliary exhaust, concentric intake and exhaust valves and the dome-headed cylinder are still in evidence. The multiple-disk clutch, with its alternating layers of phosphor bronze and steel disks, is enclosed within the flywheel and held by a spiral spring when not in use. Instead of the carbureter primer being located on the dash, it now is operated from in front by means of a button, which is placed at a lower corner of the hood front. Also new in connection with the carbureter is that the tributary pipe by which cool air instead of warm may be admitted to the carbureter. In winter the air is taken into the carbureter by means of a pipe running from the jacket and circling the auxiliary exhaust pipe, while when the weather warms up a butterfly valve can be closed and the right kind of air admitted through this tributary pipe, this air coming through the top of the engine jacket and which is closed in cold weather by a cap. No longer will the spark control lever be found on the Franklin, all the thirteen models depending upon the fixed spark, which was used only on the 18-horsepower car last year. On the 28 and 42 the magneto is provided with a governor. The Franklin tubular-front axle has been increased in size, while there also has been some refinements on the rear axle. The progressive type of sliding transmission, which was used on the smallest type last year, has been abandoned in favor of the selective sliding, which is now used on everything in this line. The little car also has the same bevel driving gear and pinion heretofore used on the larger cars. A new front universal joint is on all the Franklin, while a worm-steering gear is fitted. There also is an auxiliary oil pump on the dashboard, while the Franklin faith in large tires as prolonging the life of the pneumatic and increasing the riding comfort is shown by the sizes used for 1910. In addition to these changes the Franklin line shows several other improvements, most of which are minor changes.

Stevens-Duryea—Added to the Stevens-Duryea line is a five-passenger six-cylinder which is designated model AA and which differs from the Y and X in that no flywheel is carried in front, a heavy clutch cover being used for the purpose instead, assisted by a geared fan in front. The X and Y have platform springs in the rear while the newcomer boasts of three-quarter elliptics in that position. In other respects the new car carries all the familiar Stevens-Duryea earmarks, the six-cylinder motor, rated at 35 horsepower, having a bore of 4¼ inches and a stroke of 4¾. The cylinders are cast in pairs and the waterjacket valve and firing chambers are integral. The exclusive Stevens-Duryea feature which permits of the removal of the pistons without taking out the cylinders or breaking the water connection is retained, the scheme being worked by taking off the bottom half of the crankcase and the cap on the lower half of the connecting rod. As for the other two cars in the Stevens line, the Y is continued from 1909 and is a four-cylinder five-pasenger car, while the X series first was started in 1908 and now is on its third year, a six-cylinder seven-passenger car. The familiar Stevens engine is about the same, being of the L-type with the valves side by side and operated from one camshaft, while lubrication is by means of a mechanical oiler which is driven by a bevel gear and which forces the oil direct to the crankshaft bearings, the overflow supplying the splash system. Novel in the carbureter is a dash adjustment which permits of varying the tension of the spring controlling the valve of the auxiliary air opening. The needle valve in the nozzle and the throttle are adjustably interconnected, while the intake pipe is a restricted one greatly resembling the system used by the de Dion. Gravity feed is used in the gasoline system. Fully as conventional, a centrifugal pump bevel-driven delivers the water into the base of the jacket on the non-valve side. The Stevens still sticks to the progressive type of transmission, while the clutch contains alternate sets of disks, one secured to a carrier on the crankshaft and the other to a carrier on the transmission. The driving disks, made of steel, are faced on each side with woven wire and asbestos, the clutch operating without oil but being

Four Town Cars As Prepared

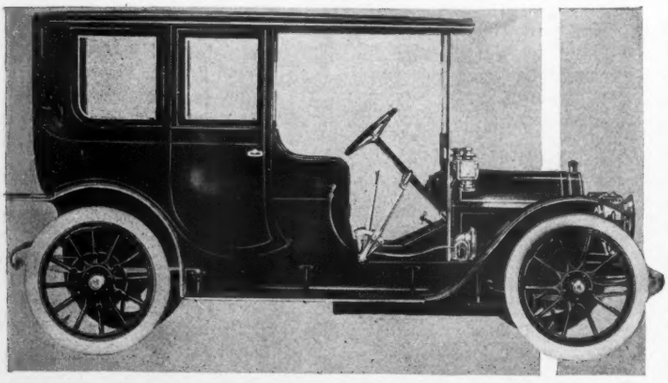


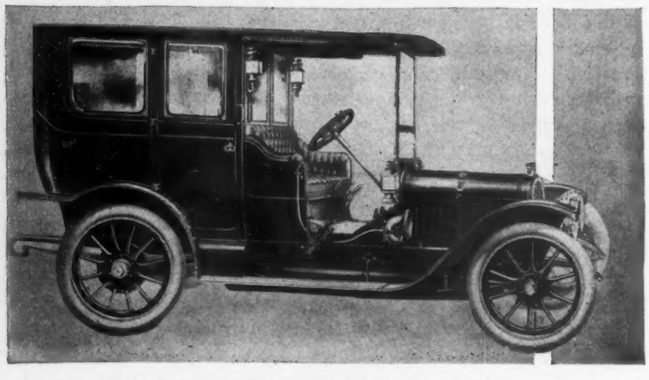
PACKARD 18 TOWN CAR



THOMAS 1910 TAXICAB

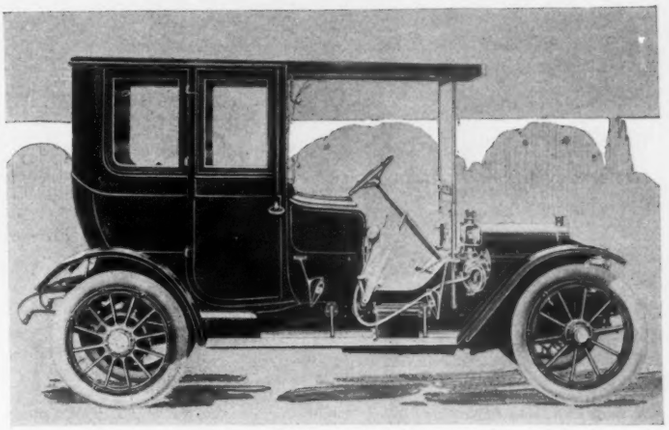
Some New Limousine Cars



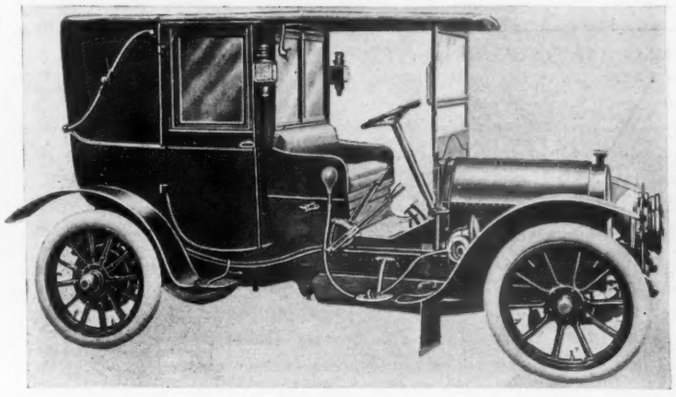


CHALMERS-DETROIT 30 LIMOUSINE
POPE-HARTFORD MODEL Y LIMOUSINE

For the Coming Season's Use



STEARNS 15-30 TOWN CAR



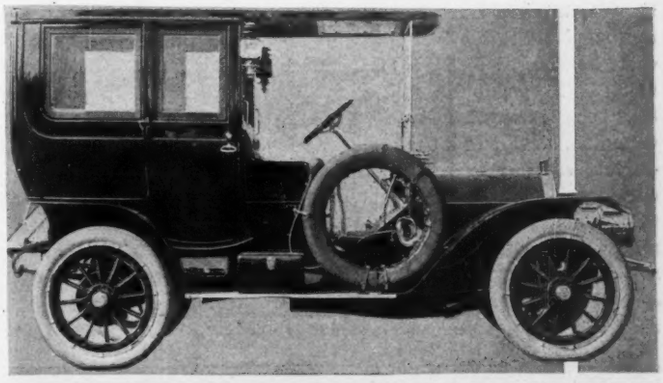
PALMER & SINGER P. & S. TOWN CAR

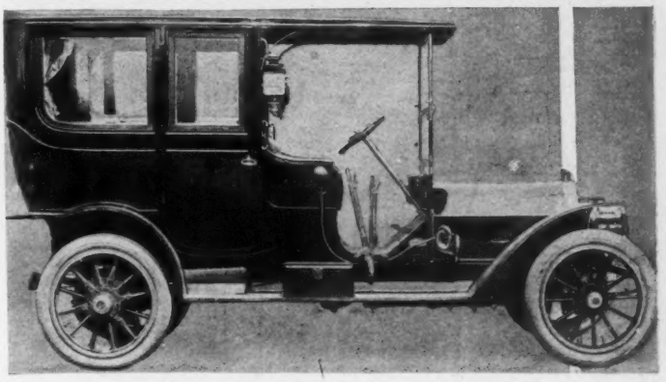
entirely inclosed and protected from dirt. The disks may be adjusted by a device furnished for that purpose.

Alco—Although having used shaft-drive in the 22-horsepower town car since 1907, the American Locomotive Co. has instituted a radical departure by changing from chain to shaft in its 40 and 60-horsepower models. Accompanying the double chain-drive into the discard goes the make-and-break system of ignition, and on all the Alco pleasure cars for 1910 there will be featured shaft-drive and jump-spark ignition, the Bosch dual system of high-tension magneto and storage battery, with one set of spark plugs being employed in the latter. A floating rear axle construction also is offered, but neither it nor the shaft-drive is an experiment, having first been shown on the Alco town car in March, 1907. With these main changes to attract attention the public is asked to inspect a line which consists of a six-cylinder 60-horsepower chassis, fitted either with touring body, toy tonneau, limousine or landaulet; a four-cylinder 40-horsepower chassis with any one of these styles of bodies; a four-cylinder 22-horsepower chassis in either limousine or landaulet type; a four-cylinder 16-horsepower cab and a four-cylinder 24-horsepower 3-ton truck. In the Alco full-floating type of rear axle the supporting member is a one-piece drop forging, which is continuous from end to end, the bevel gears and differential mechanism being carried by the forward housing. A radius bar of pressed steel takes up the driving and braking torque and is attached to a cross member of the frame. Alignment of the axle is maintained by the rear spring seats being swiveled, the radius rods surrounding the axle at the rear and the universal joint at the front end being attached to a bracket on the frame. On the propellershaft are two universals and a slip joint. As before, the French type castings are imported and it is evident that the engine valves have been slightly increased in diameter, the shape of the cams and plungers have been changed to effect quietness in the latter, while noiselessness is aimed at in the treatment that has been given the transmission. The sliding selective type of transmission gives four speeds with direct drive on high, the transmission case being supported at three points, two of which are in the rear and one in front, the front support having a swiveling action which is intended to relieve the strains of the transmission case due to twisting of the frame and at the same time keeping it in alignment with the motor. Driving disks of sheet steel are used in the multiple-disk clutch, and the driven disks, which are made of sheet bronze, are entirely enclosed and run in oil. The square-tube radiator has been retained, but the steering gear is made heavier and with adjustable bearings, so that all adjustments can be made outside of the case. The straight-line drive to the rear axle is had by tipping the motor and transmission slightly at the rear. No change has been made in either the spark and throttle control or the oiling system, but the frame has been raised ¾-inch at the rear to give sufficient clearance over the rear axle. The wheel hubs are made of drop forgings. Tires are 36 by 4 in front and 36 by 5 in the rear, and the wheelbase of the 40-horsepower car is 126 inches and of the 60-horsepower 134 inches.

Corbin—The Corbin continues for next season its policy of marketing one size of motor, which is fitted in all of its models. This motor is of the four-cylinder type, characterized by separately-cast cylinders of L design, the intake and exhaust valves all being located on the left side. With the exception of minor improvements the changes in this car have not been in any wise radical. To begin with, the wheelbase has been increased from 108 to 120 inches, so that for this year bodies are much roomier and generally more capacious than last season. An important change in the chassis is that the bottle-neck frame is introduced—by bottle-neck being meant the bringing together of the side members at the dash to increase the turning ability of the car. Nickel steel is used in this frame. The front springs have been altered and are now of the flat type, the bow or arch being eliminated. Rear springs are three-quarter elliptics instead of semi-elliptic, and they are made especially long. An alteration in the steering gear is that it is of the worm-and-gear genera, the gear taking the place of the sector of previous years. The gear and its shaft constitute

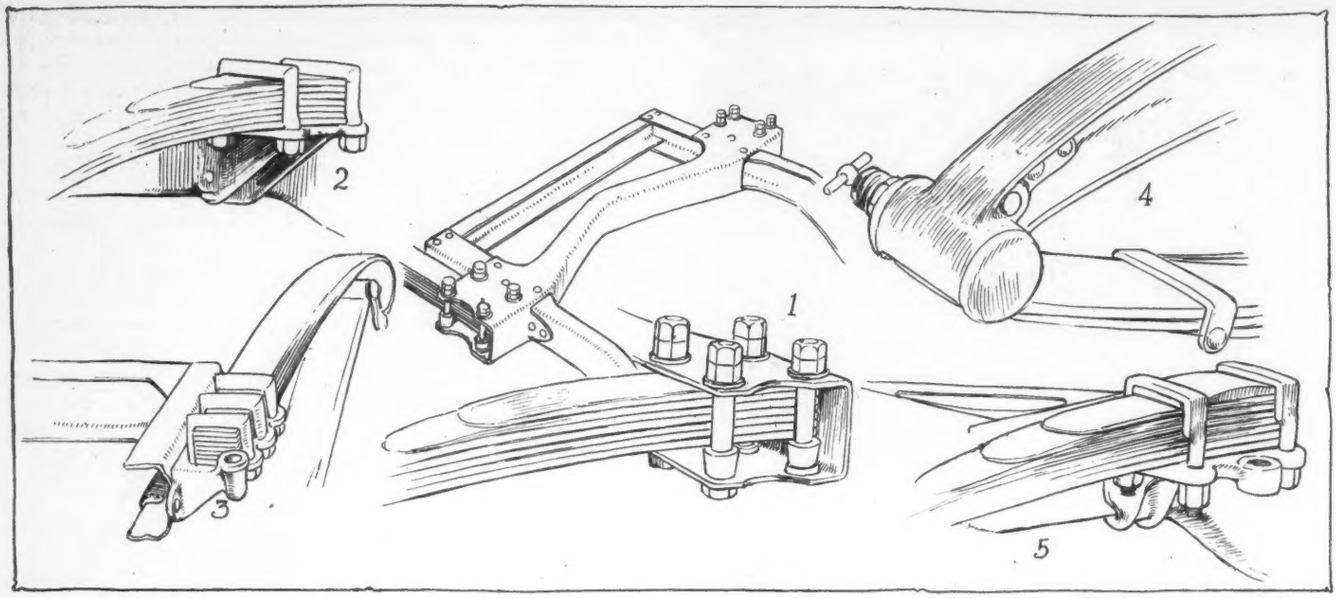
New Types of Closed Bodies





KNOX FOUR-CYLINDER LIMOUSINE

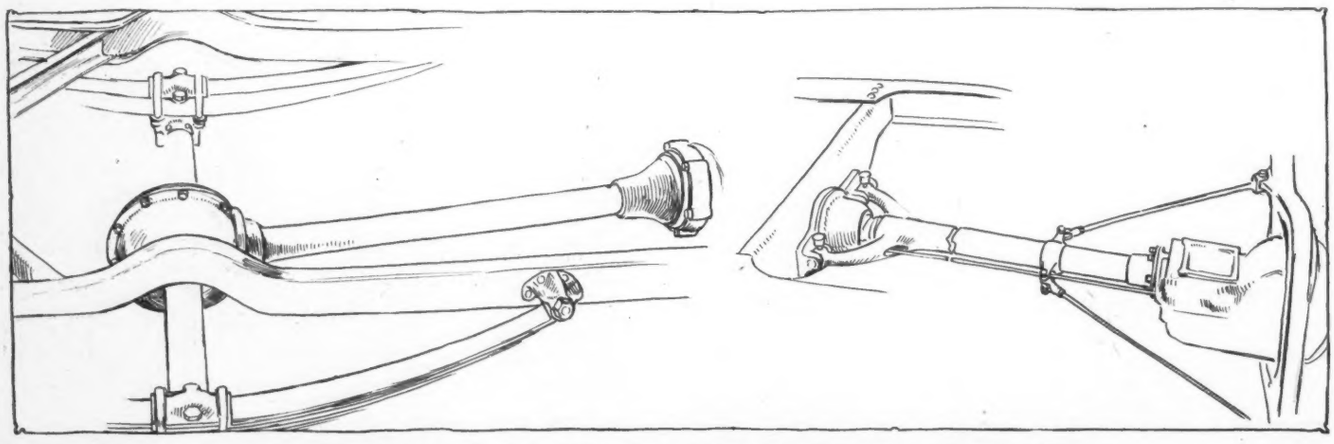
STEVENS-DURYEA FOUR-CYLINDER LIMOUSINE



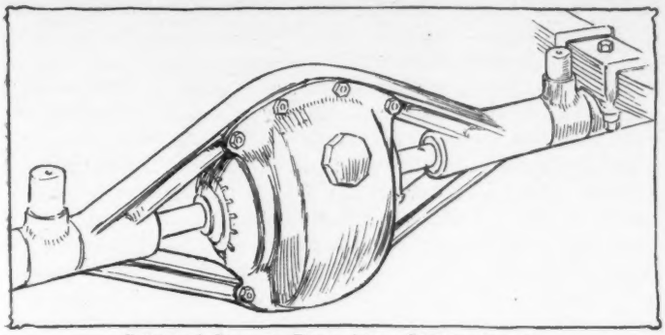
1—Stearns Spring Anchorage 2—Elmore Spring Support 3—Overland Spring Fastenings 4—Oldsmobile Front Spring Horn 5—Chalmers Fastening

an integral forging and on the end of the shaft the radius rod fits on a squared taper, thereby permitting of bringing a new set of teeth of the gear into use should one lock become worn. The gear-shaft of the steering gear now passes out through the frame instead of being beneath it, as formerly. A commendable alteration is that the fore and aft connecting link from the steering gear arm to the tie rod is above the axle, where it is well removed from harm's way. Last year the steering column rose through the footboard, but for this year it enters through the dash and is considerably more raked. Passing to improvements on the motor, it must be noted that helical hanging gears are now employed to drive the camshaft, and these gears are completely inclosed, which is an improvement on this motor. Spur gears were used previously. A slight change in the oiling system is that the oil pump is now located on the lower end of the vertical timer shaft and the oil is first elevated to sight feeds on the dash, whence it is delivered to a manifold to the four cylinders and to the three central crankshaft bearings, which are of the plain variety. The end bearings being ball type, do not call for special lubrication. The rear axle has been strengthened in that the driveshafts are now of vanadium steel, and a change in the front axle, which is of I-beam section, consists in its being made ½-inch deeper. In keeping with the general enlargement of the car, 34 by 4-inch tires are fitted all around, this being ½ inch larger on the front wheels than was fitted last year. A magneto is now standard equipment, as is a gas tank for the headlights. Never before has this concern given such a variety of bodies for buyers to select from, the list including five and seven-passenger touring cars, toy tonneau, roadster, limousine and a torpedo design. In summarizing it will suffice to state that the bore and stroke of the motor have not been changed and the clutch and selective gearset are identical with those employed last year.

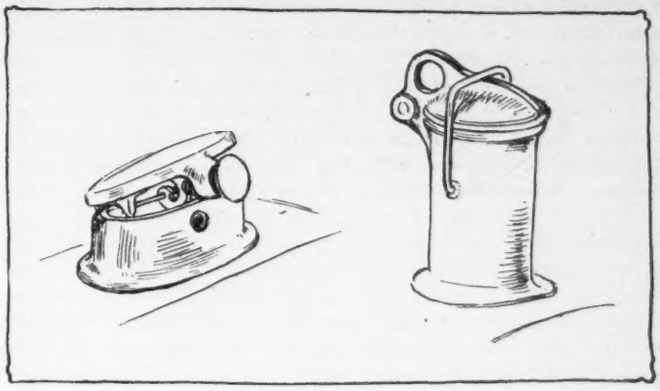
Oldsmobile—In preparing for the new campaign the Oldsmobile has gone carefully through its line, eliminating here and adding there, until now it has ready for the consideration of the motoring public touring, close-coupled roadsters and limousine bodies fitted to four and six-cylinder chassis, the four being a 40 horsepower and the six a 60, the former classed as the Oldsmobile Special, and the latter as the Oldsmobile Limited. The manufacture of the model X-3 and X-Special has been discontinued, as also has the landaulet type for the four and six and the detachable toy tonneau for the roadster. The coupe also has disappeared and there is a close-coupled car to take the place of the four-passenger tonneau. The Oldsmobile designer has seen fit to add 6 inches to the four-cylinder and has let the six stay where it was. The four has had its seating capacity increased by two through the lengthening of the body and the installation of two removable auxiliary seats. Wood is used in the body construction of all but the roadster and limousine, which use sheet aluminum. The Olds people have stood pat with their motor but in the transmission there is one change worthy of note and which will be standard on all models, that being the addition of another speed forward, giving the set four speeds forward and reverse. In the ignition system it will be found that the Oldsmobile is using the Bosch magneto, with a 4-volt dry cell battery for starting. The Olds carbureter is a modification of the venturi



Cadillac's Rear Axle and Driving Features and Stearns Torsion Tube and Radius Rods



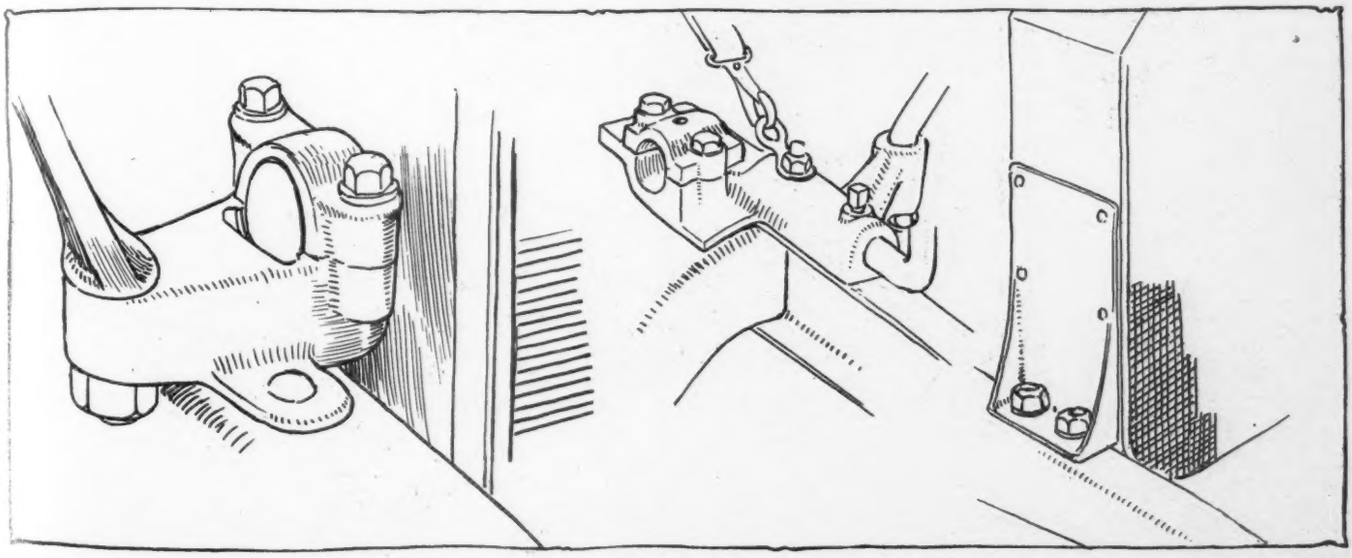
STEARNS' IDEA OF REAR AXLE CONSTRUCTION



OVERLAND AND PACKARD RADIATOR CAPS

tube type. The gasoline capacity has been increased and the tanks range from 22 to 40-gallon sizes. Pressure feed was used only on the six in 1909, but for the new year it will be fitted to all the models excepting the roadster and close-coupled cars. The brakes, while of the same type, are of heavier construction and of larger diameter. The full-elliptic rear spring has been succeeded by the full-elliptic three-quarter type, while shock absorbers are standard on all models. A change has been made in the rear axle, which now is of the full floating type with annular ball bearings, as made by the Weston-Mott Co. Forty-two-inch wheels are standard on all six-cylinder models, while the number of spokes in the rear wheel has been increased to fourteen in the six, the tire sizes in this type being 42 by 4½, while the four-cylinder cars carry 36 by 4. As for the Olds motor, the four-cylinder type has the valves on one side, the gears being enclosed. The bore and stroke are square, 4¼ inches, the cylinders being cast in pairs. On the six-cylinder model the cylinders are of the same size and also cast in pairs and in other details conforming with the four. Both chassis use the cellular type of radiator, have a water pump, a leather-faced cone clutch and, in fact, the main difference is that the six has two more cylinders.

Lozier—The Lozier line for 1910 remains practically the same as it was in 1909, but a few details have been changed, chief among which is the adoption of a squared tube type of radiator and a slightly changed transmission. Both of these are more in the nature of refinements than radical changes. The body equipment also remains the same with the exception of the new Lakewood body of the torpedo type, which was recently brought out by the Lozier. The light six-cylinder model, which was produced late in the 1909 season, differs from preceding Lozier cars in many respects, among which might be noted having both intake and exhaust valves on the same side of the cylinders, using a crankcase-contained lubricating system, and the employment of tubular sub-frame members for carrying the motor and gearbox. The big six is continued practically without change, but the four-cylinder car has been altered by increasing the cylinder diameter ⅛-inch so that now the sizes are 5⅜-inch bore and 5¼-inch stroke. From a constructive point of view one of the important changes used on the four-cylinder and big six models is a new transmission box made in one piece instead of being divided into upper and lower halves, a feature which greatly increases its oil-retaining properties. The main and countershafts, carried on ball bearings, are supported in the ends of the case and cover plates are used to prevent the leaking of oil at the bearings. A further important change is the redesigning of the quadrant for the gear-shift lever, which now gives first and fourth speeds when moved in the same slot, while second and third speeds are obtained in the other slot. One of the characteristic features of the light six is the lubricating system. This is of the constant circulating self-contained type, a large 3-gallon oil compartment being cast integral with the engine pan at its rear end. At the lowest point of this receptacle is situated a positive-driven gear pump. This forces the oil through a broad channel to the main crankshaft bearings, from whence it is delivered to the crankpins by centrifugal force. The surplus is thrown off and lubricates the pistons and cylinder walls, and the oil that is left then returns to the reservoir where it is screened and again pumped through the motor. In this way there is very little waste of oil, it is impossible to make the motor smoke, and the oil being forced through the bearings is in exact proportion to the engine speed. Externally one of the biggest changes in the Lozier is the adoption of the squared tube honeycomb type radiator instead of the round tube type of former years. This change considerably alters the front view of the car. In all models the general use of ball bearings is continued as heretofore. In the four-cylinder big six models the annular ball bearings is used as much, and perhaps more, than in any other American-made car,

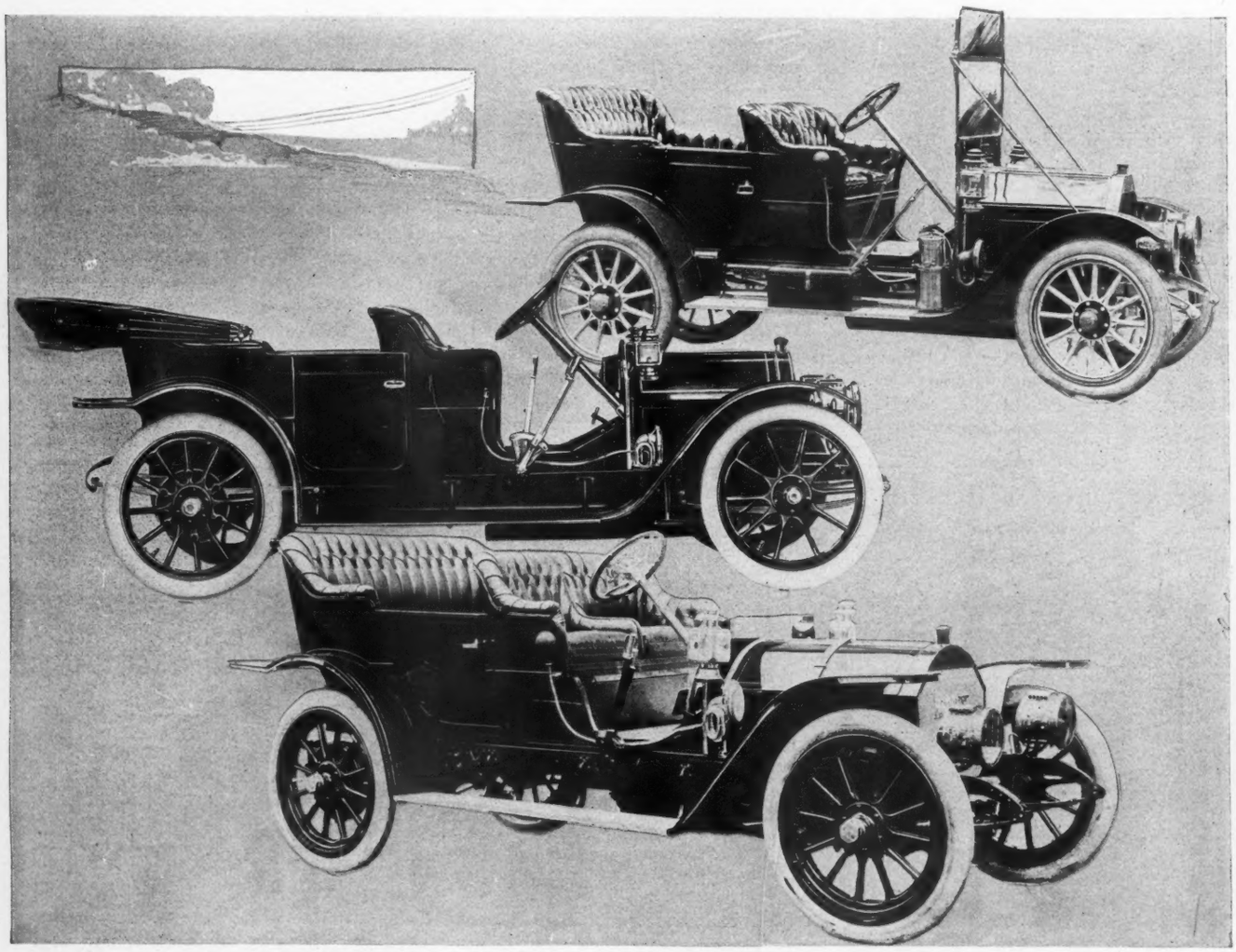


CHALMERS TRUNNION, OVERLAND TRUNNION AND MATHESON RADIATOR SUPPORT

these bearings being used for the crankshaft, camshaft, magneto and pumpshaft, clutch, transmission, rear axles, front wheels and steering gear.

Hudson—On the market for only a year, and that in roadster form only, the Hudson people come out at the show with a little surprise which they have kept carefully concealed up to this time, a new five-passenger touring car. The original plans of the Hudson company for 1910 calls for the construction of one model and that a roadster, of which 5,000 were to be built. But so great was the pressure brought to bear upon the company by its agents that the plans had to be revamped, the result being the addition of the touring car to the line and which is being shown for the first time in the garden. A feature of the 1910 Hudson roadster is the roominess between the front edge of the front seat and the dash—30 inches—and in the touring car this same roomy idea is carried out. In general design the Hudson touring car, which is of the same type chassis as the roadster, only 10 inches longer, has the same type of a Renault long-stroke motor found in the roadster, the same selective sliding gear transmission, same clutch and same style spring suspension. It has a wheelbase of 110 inches and carries 32 by 3½-inch tires all around, there being 36-inch semi-elliptic springs in front and 46-inch three-quarter elliptics in the rear. In other details the touring car and roadster coincide—the leather-faced cone clutch, slip springs under covers, force circulation, splash lubrication, plunger oil pump, vertical tube radiator, I-beam drop forged front axle, and with the electric source derived from coils and dry cells but with provisions made for a magneto. Following out the long stroke idea, the engine shows a bore of 3¾ inches and a stroke of 4½, the engine developing 20-25 horsepower. The cylinders are cast en bloc. Crank, transmission and all gear-cases, runningboards, caps and toe boards are of aluminum while it is a notable fact that there are 123 drop forgings used in the car. The pressed steel frame is 3½ inches deep and with 1½-inch channel lips, while a drop sub-frame carries the power plant. Aiming to protect passengers from the mud thrown up from the road, Designer Dunham has closed the space between the long sweeping fenders and the frame, while the rear fenders are set into the housing. Another point where attention to detail is shown is found in the manner in which the toe board, spring, steps and runningboard are attached, these being bolted from beneath and with no bolt head showing above. The foot throttle is unique in that it is a self-graduating accelerator, while the front seat is undivided. Also the doors swing from the front, a practice which heretofore has been confined largely to higher-priced cars. The body is of the straight-line five-passenger type and swinging entirely between the two axles. Although it hangs low there is ample clearance.

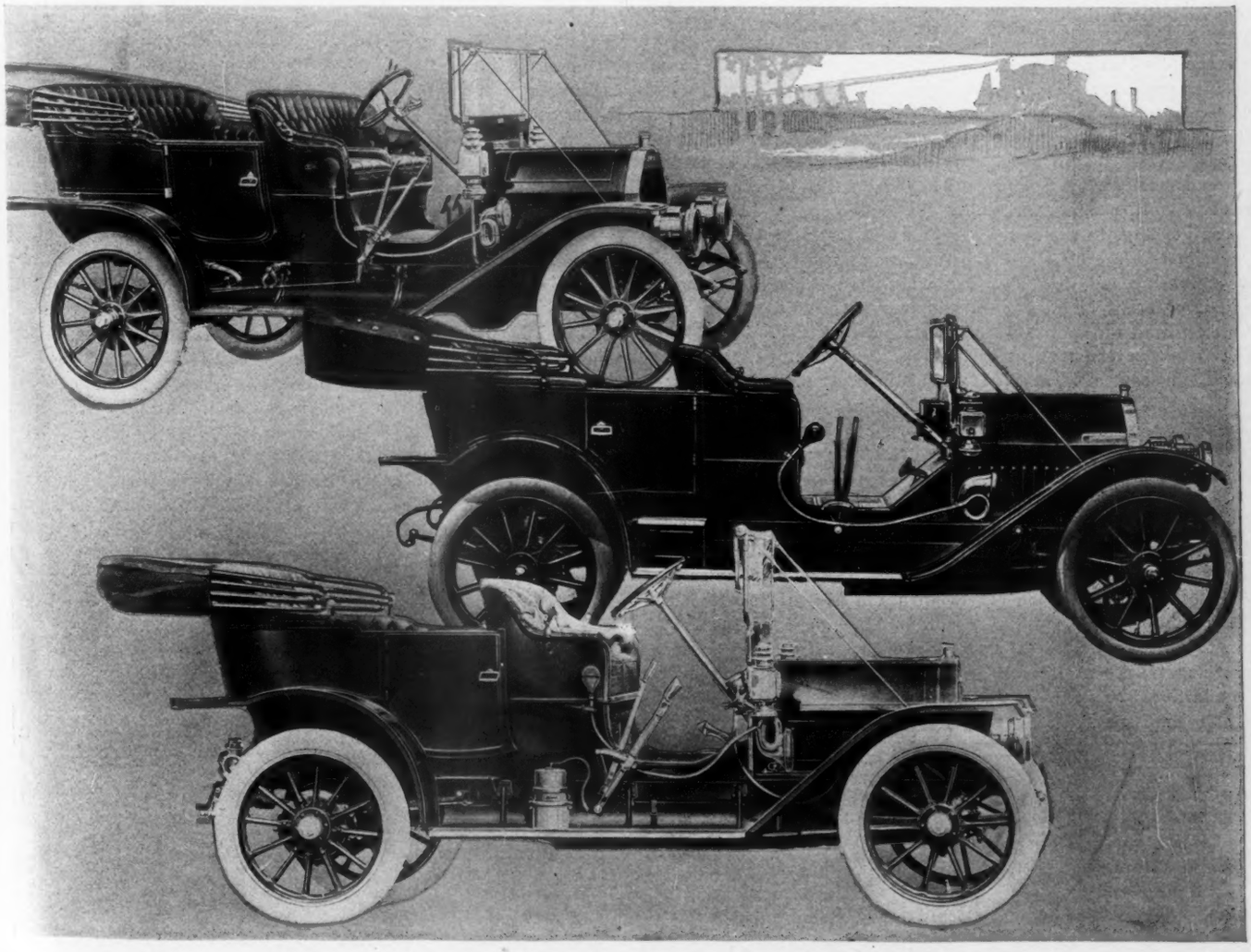
Pope-Hartford—Briefly stated, the new Pope-Hartford shows a motor with increased power and which has metal timing gears of special construction, the introduction of which into the Pope-Hartford construction was to secure quietness. Last year fiber idlers were employed for this purpose. Also there is an improved clutch, a change in the lubrication scheme, a new torque rod and a roomier body. The wheelbase is 118 inches while 36-inch wheels are employed. Of these improvements the Pope-Hartford is most proud of the oiling system and the torque and radius rods. In the oiling system there is a mechanical oiler which has in addition to its regular pump a large suction pump and an overflow standpipe, while the oil reservoir is located underneath and cast integral with the crankcase, the system depending upon splash speed for its oil supply. The new torque rod adopted is



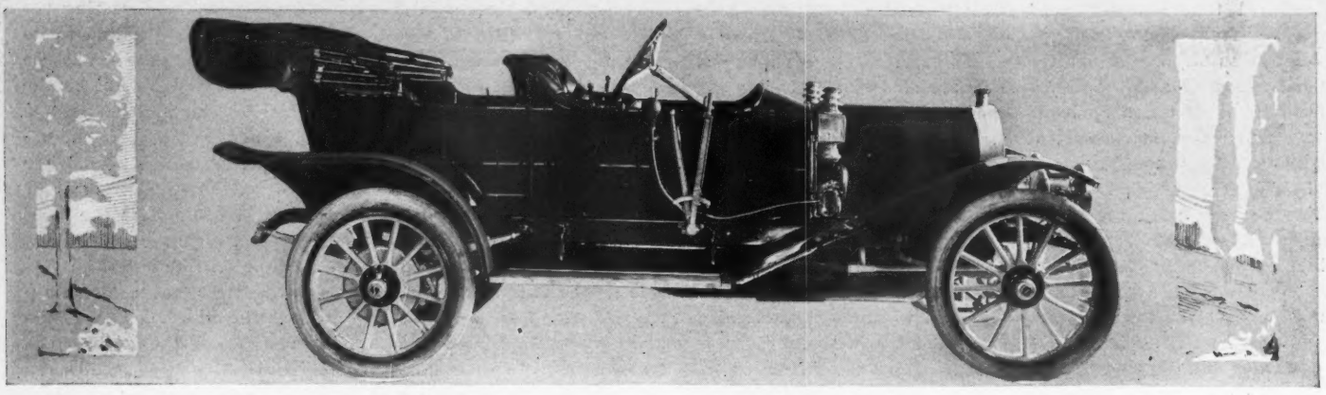
TOP—BUICK TOURING CAR; MIDDLE—CHALMERS-DETROIT 30; BOTTOM—MERCER

of trussed tubular construction and pivoted on the rear axle case, the front end with its spring bumpers being fitted to a special cross member of the frame. The rear spring seats swivel on the rear axle and the rear springs are shackled at both ends, the drive being taken up by two adjustable radius rods. Novel in the rear axle construction, which is of the floating type, is the use of two alloy steel shafts, the outer ends of which are square and on each of which is fitted a six-jawed hardened steel clutch which engages with corresponding notches in the rear wheels, the clutch and hub being held in engagement by the hub cap, which is locked by the axle shaft, all of which makes possible the removal of the axle shafts and the entire differential construction with the car standing on its own wheels. At this point it is noted that there is a screw adjustment for the Timken bearings located on the bevel pinion shaft. With the exception of the hand lever the gear-changing mechanism is entirely encased and the three-speed selective transmission has chrome nickle steel shaft and gears with the engaging ends of the teeth beveled by new process. The Pope-Hartford motor, which is rated at 40 horsepower, has its cylinders cast in pairs and with the heads and waterjackets integral with the cylinders. The valves are located in the head and the cylinder dimension are $4\frac{5}{16}$ inch bore and $5\frac{1}{8}$ inch stroke. An external brake on the transmission shaft at the rear of the gearbox and one set of expanding brakes on the wheels, making three brakes in all, make up the Pope-Hartford system which therefore is different from the general run. Seven different styles of bodies are offered.

Knox—A six-cylinder model with a bore of $4\frac{3}{4}$ inches and a stroke of $4\frac{7}{8}$ has been added to the Knox family, which also includes models R and M, R being the continuation of the 1909 O and M, also a holdover. The Knox power plant still is of the unit type and with three-point suspension, but instead of casting the yoke integral with the crankcase the side arms are bolted to its rear, the transmission making the rear end of the yoke. The use of separately-cast cylinders is continued in R and M, but on the six they are cast in pairs. The six also has an ignition system which employs the Atwater Kent idea and Bosch ignition, the double system employing two sets of plugs. Also another change comes in the placing of the centrifugal water pump at the right side of the motor and running it by spiral gears from the camshaft. There is considerable similarity between the lubrication system used on model M and O in that the oil line is on the outside of the case instead of being cored in the crankcase casting. Accessibility was the idea aimed at when the oil scheme filler pipe and by-pass were placed on the left-hand side of the motor. The transmission, which is of a three-speed selective type, makes the rear part of the detachable yoke, which is one of the new Knox features. Noticeable in this transmission is the shortness of the lay-shaft, which does away with the fluted hollow shaft, while it also is easy to note that there are no nuts, cotter pins, tubes or moving parts in the transmission except on the shaft bearings, gears and shifting pins. The clutch brake differs from that used on the model O in that it is composed of two friction disk plates covered with raybestos and thermoid and operated by a clutch foot pedal. There is an eight-bladed cast aluminum fan, which is driven by a leather-covered chain belt, which runs in an adjustable grooved wheel. The steering, also new, is of the double screw-and-nut irreversible type, which acts on a rocker at the bottom and which works a dog crankshaft. On all models I-beam front axles are used, and the front wheels have steering pivots running on Timken bearings. The model R semi-floating rear axles are so made that the rear axle shaft can be detached with-



TOP—E-M-F TOURING CAR; MIDDLE—HUDSON; BOTTOM—CADILLAC

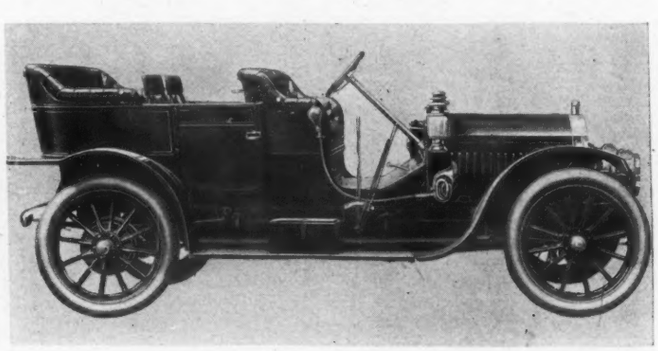


SELDEN CAR WITH FRONT-SEAT DOORS AND HOODED DASH

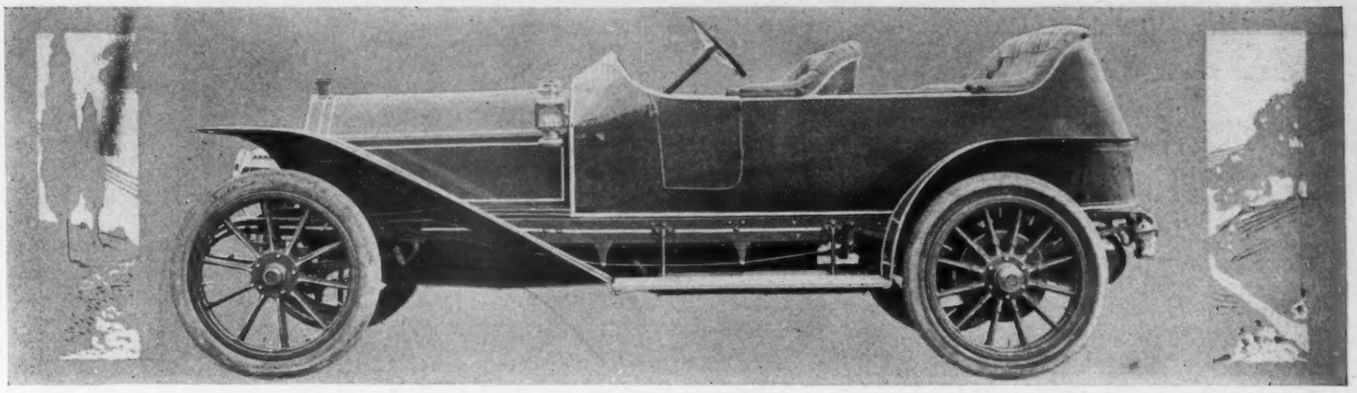
out dismounting the axle or unbolting the housing. On the shaft-drive cars, the M and S, the rear axles are of the full floating type. Contracting and expanding brakes operating on the rear wheel drum are new, the outside or contracting brake being of the foot type and adjustable by a turnbuckle at the front and an eccentric at the rear of the band. The emergency brake is of the expanding band type, acting on the inside of the double drums and is adjusted by changing the rod. Both are fitted with evener equalizers. With the exception of the raceabouts, which have springs designed for speed cars only, the front springs on all models are of the semi-elliptic type with three-quarter full elliptics in the rear. Model R is fitted with side radius rods, and the other two have both torsion and radius rods to take the driving strain. Close-coupled and the torpedo type of bodies are new in the Knox line.

Cadillac—It is the claim of the Cadillac company that the 1910 Cadillac is a far greater achievement than the Cadillac of 1909, and the dominating features or changes upon which it bases these claims are: A larger engine, longer wheelbase, larger wheels, larger tonneau, giving respectively more power, increased efficiency, larger tires and more room. The wheelbase has been increased from 104 to 110 inches and the wheels and tires are enlarged from 32 by 3½ to 34 by 4-inch in all regular models except the limousines, in which the wheelbase is 114 inches. The only change in the motor is that where last year the cylinder dimensions were 4 by 4½ inches they are now 4¼ by 4½ inches. By increasing the length of the wheelbase 4 inches more leg room is obtained in both front and rear seats of the body, and the body lines are now more of a straight-line type. The frame is arched over the rear axle this year instead of being simply dropped in front of it, and it is claimed a lower center of gravity has been obtained thereby. The front support of the torsion tube which encloses the driving shaft has been enlarged and strengthened, and by means of a telescopic arrangement the foot pedals have now a 4-inch range of adjustment. Two new special body types are added to the line for 1910, which include a seven-passenger limousine, which will be fitted to a chassis with 120-inch wheelbase; and an ambulance body, which will require a chassis with 134-inch wheelbase. These chassis are similar in all respects to the others with the exceptions of slight changes in dimensions. The motor on all cars is of the four-cycle type, the cylinders cast singly and fitted with copper waterjackets; the radiator is of the vertical tube and plate type and additional cooling is furnished by a belt-driven fan mounted on ball bearings, and a gear pump which is gear-driven. The lubrication of this motor is conspicuous by the entire absence of leads to the cylinders, the only visible outside lead being one from the plunger pump in the outside oiler to the crankcase. The clutch is of the cone type, leather-faced, and the ring it seats in is split in eight parts, with each of these acting as a separate spring to ease engagement. Between the clutch and gearbox is a combination universal joint. The transmission system is in brief a selective gearset, an enclosed propellorshaft, and a floating rear axle; and the gearbox, a one-piece casting, is suspended beneath two cross members of the frame, thus providing for its removal without taking off the body. The three-quarter platform spring suspension employed in the rear is still maintained. Three-point suspension is also a feature of the motor, annular ball bearings are used extensively, and, in fact, the car is in many respects an improvement and refinement over previous four-cylinder Cadillacs.

Chalmers-Detroit—Having become segregated from the Hudson by the division in the Chalmers-Coffin-Chaffin ranks, the Chalmers company is putting forth all its efforts in the production of its two models, the 30 and 40. Featured in the smaller type for the coming year are a double-drop frame with heavier side members, a unit power plant with the en bloc motor and larger cylinders, valves and tires. In the 40 the motor is a separate unit with the cylinders cast in pairs; it has the double-drop frame and there is a new rear axle, while improvements have been made in the clutch and transmission. The motor of the Chalmers 30 shows an increase in power, the jump being to 25.6 because of the increasing of the bore from 3⅞ inches to 4, the stroke remaining at 4½ as before. Increasing the wheelbase from 110 to 115 inches makes possible an improved suspension of the body with reference to the axle, as well as a better body design. Previously the motor and body were suspended well between the axles, which was made possible because of the compact power plant. The same practice continues, but it has been improved upon by the lengthening of the wheelbase. Going to the oiling system, it is discovered that a more accessible location has been secured for the plunger oil pump by placing it on the left side of the motor. The double-drop frame, which is used for 1910, shows one drop midway of the chassis and the other immediately in front of the back axle, the idea being to use three-quarter elliptic rear springs and to bring about a particularly low entrance to the tonneau, the change making the step from the runningboard to the tonneau floor so slight as to be hardly noticeable. The result of visits to Europe by Messrs. Coffin and Chapin is shown in the making of the side members of the frame heavier than before, a practice which meets with the approval of the best foreign engineers. These side channel members have a vertical depth of 4 inches with 3½-inch channel lips, these lips being extra wide from the offset at the dash and tapering to the rear until the union of the cross member of the back is reached. Wheel sizes have been jumped from 32 to 34, and 3½-



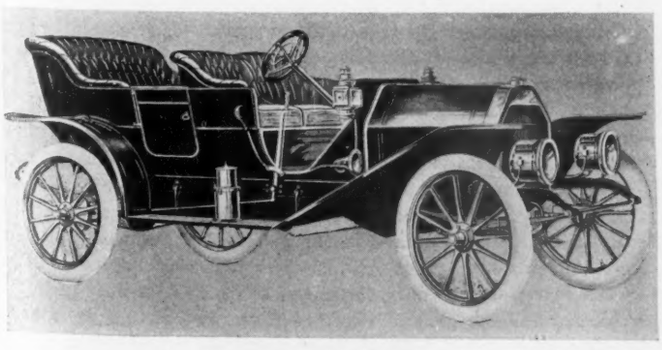
ELMORE 46, SEVEN-PASSENGER CAR



THE PALMER & SINGER P. & S. TORPEDO WITH GUNMETAL FINISH

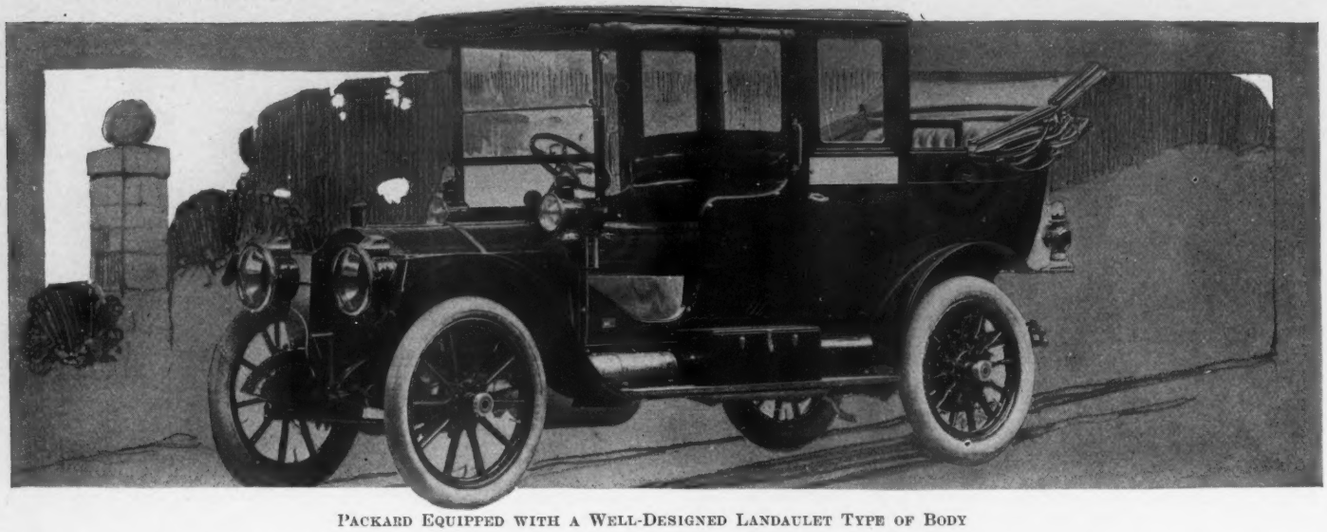
inch tires are fitted. Although members of the same family, there is a wide variance between the 30 and 40 in that the motor in the 40 is a separate unit, the selective gearset is located amidship and a new type of rear axle is fitted. There is a three-bearing crankshaft, and a honeycomb radiator has sidetracked the vertical tube type formerly used. The operating mechanism of the leather-faced cone clutch has been modified to lessen the pressure needed to one-third of that required last season, but otherwise the clutch remains the same. In the gearbox it is noted that the countershaft now is beneath the main shaft instead of above it. The idea of this is to permit of caps being fitted over the openings in the case for the countershaft bearings. In the torsion system is employed a triangular arm instead of a single leaf, while a new idea in the rear axle shows a pressed exterior autogenously welded along the neutral axis so that the truss rod is not needed.

Stearns—While no new models have been brought out for 1910, the Stearns company has made one or two minor alterations in its 1910 product, one of which is the employment of a new dry multiple-disk clutch, which is being fitted to the 30-60 horsepower car. Also there has been a slight enlargement in the body used on the touring car chassis. Students of motor engineering will note the rear axle construction on the 15-30 horsepower model, the construction of which the Stearns company is proud. The solid axle is a one-piece steel forging, no dependence for strength being placed on the universal joint. Arms embrace the gearbox and also the extension of this gearbox, inside of which are the gears, which are of the selective type. The torsion tube is originally bolted to the front end of the gearbox and within the gearbox is a propeller shaft, and at either side of the shift rods by which the different speeds are obtained. The cross member of the frame is particularly deep and carries a ball-thrust socket, which is bolted to it and inside of which operates the pivot ball, which is attached to the forward end of the torsion tube. By the use of this idea there is a universal action, which compensates for the up-and-down movement of the springs. The new clutch is controlled in the barrel housing, which is bolted to the flywheel cap. One set of disks is attached to the transmission shaft through a hub construction, which is a squared fit on the forward shaft. Another set is attached to the flywheel through a hub part. A corrugation on each set is a peculiarity of this construction. By the introduction of a ball bearing the forward end of the shaft is supported direct through the bearing on the small end of the crankshaft instead of having a bearing at this point. A peculiarly-shaped thumb bolt, which bears upon the corrugations of the end disks, controls the spring for the engagement of the disk and transmits direct to the flywheel set of gears. The 30-60-horsepower Stearns comes in shaft and chain-drive type and uses the same oiling system as the 15-30, which is one of the changes which has been made recently.



OVERLAND FIVE-PASSENGER

Selden—The Selden line for 1910 remains practically the same for 1910 as far as general design and construction is concerned. But wherein last year the several body types were all fitted to a standard chassis, three chassis are employed for 1910, all similar in design but differing as regards size of motor, wheelbase and size of wheels. The chassis of last year had a four-cylinder 29-horsepower motor, with a 4¼-inch bore and 4½-inch stroke, and the wheelbase was 114 inches, while the wheels were 34 by 3½ inches in front and 34 by 4 inches in the rear. This year there is a larger chassis with a 36-horsepower motor having a 4¾-inch bore and 5-inch stroke. To this chassis five-passenger touring, a three-passenger roadster, a new four-passenger torpedo, and a seven-passenger touring car bodies will be fitted. Changes exist only in the wheelbases, the size of the wheels, and the capacity of the gasoline tank. On the five-passenger touring car the wheels are 34 by 3½ inches in front and 34 by 4 in the rear, the wheelbase is 116 inches, and the capacity of the gasoline tank is 16 gallons. The chassis of the three-passenger roadster and the four-passenger torpedo are similar to that of the five-passenger touring car in every respect except that the capacity of the gasoline is but 14 gallons, and a Bosch magneto is fitted to the torpedo types as regular equipment. The seven-passenger touring car also is similar with the exception that the wheelbase is 122 inches, the wheel dimensions are 36 by 4 front, and 36 by 4½ rear, the capacity of the gasoline tank is 16 gallons, and the Bosch high-tension magneto also is included as regular equipment. The mechanical features of the car are a four-cylinder water-cooled motor with the cylinders cast in pairs, and an offset crankshaft. The valves, the carbureter, timer and oil pump are all on the left side, while the fan-belt pulley, the water pump and the magneto are all driven off the same gear, which is inclosed with the timing gears. The carbureter is of the single-jet gravity-feed type, while the lubrication scheme consists in keeping the oil constantly in circulation by a gear pump, driven by an extension off the commutator shaft. The reserve lubricant is contained in a lower oil reservoir which is cast integral with the lower half of the crankcase. This reservoir holds 3 quarts, is filled by pouring the lubricant into the breather pipe which is located at the right rear end of the motor in accessible position, and an indicator is provided to show the height of the oil level. After the pump is in operation the oil passes into the four compartments of the crankcase and after raising to the proper level overflows into the reservoir. Ignition is either single or double jump spark with a Bosch magneto and storage battery as sources of current. Cooling is assisted by a belt-driven fan and a cen-

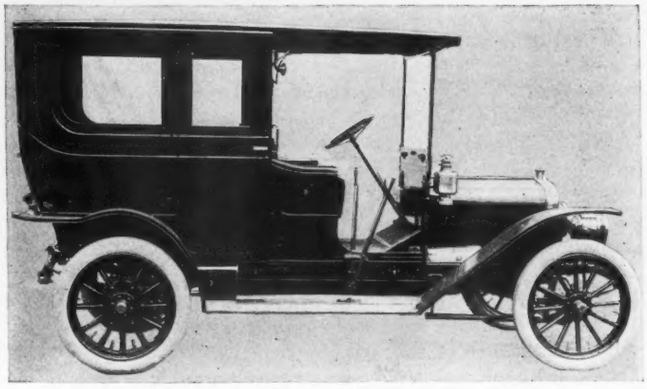


PACKARD EQUIPPED WITH A WELL-DESIGNED LANDAULET TYPE OF BODY

trifugal water pump. The selective type of transmission gives three forward speeds, while a leather cone clutch is used, which is cushioned to engage smoothly. The car is shaft-driven, and a semi-floating rear axle equipped with Hyatt roller bearings and ball thrust transmits the power to the rear wheels. The front axle is of the I-beam type and ball bearings are fitted in the front wheels.

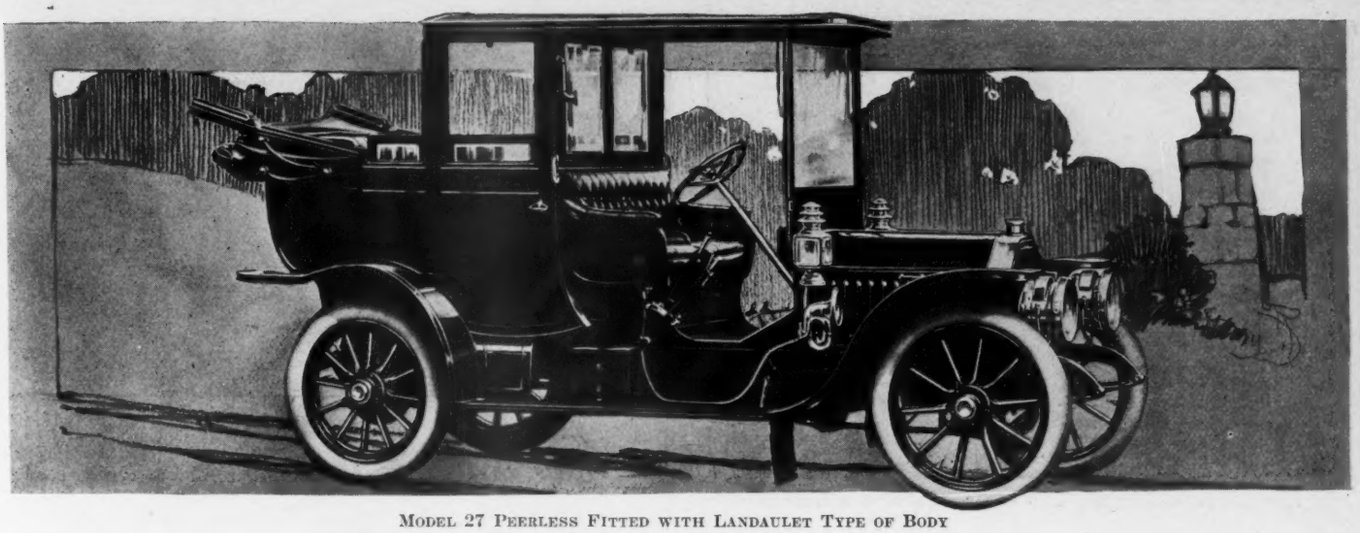
Palmer & Singer—Two chassis models will comprise the Palmer & Singer line for 1910, and these cars are practically the same in almost every mechanical detail as the '09 cars, the only change being general refinement of body styles; an option of a 128 or 132-inch wheelbase on the six-cylinder models, and an increase in the wheelbase of four-cylinder car from 108 to 115 inches. The same mechanical features are common to both chassis, the six-cylinder model differing only in the sizes of the motor, the wheelbase and the wheel. The characteristic features of the Palmer & Singer six-cylinder chassis are: A T head motor with the cylinders cast in pairs and integral waterjackets; a multiple disk clutch contained in the same case with a selective sliding gear transmission giving four forward speeds; a propellorshaft which transmits the power from the transmission to the full floating type rear axle; an I-beam drop forged front axle with the spring pads forged integral; a channel steel frame which is arched over the rear axle; a steering gear of the nut-and-screw type, and semi-elliptic springs. The valves of this motor, which are located on opposite sides, are particularly large, having a surface of 2⅝ inches and are tapered to 45 degrees. Lubrication is of the circulating splash type, with a reservoir cast on the lower side of the crankcase proper. The oil is forced from this reservoir by a gear pump, through all the principal bearings, and into the crankcase. The latter is provided with overflow pipes which allow the oil to obtain and hold a level sufficient to lubricate the piston and cylinders while the superfluous oil flows back into the reservoir. The ignition is in two distinct systems and delivers the current to two different sets of spark plugs, both of which are located over the intake valve to insure them from becoming sooted. A Bosch high-tension magneto provides the current for one set of plugs, while the other set has a high-tension coil with battery. The radiator is hung to the frame by ball-and-socket joints which makes it impossible to spring a leak from the tension or strain placed on the frame; this, a centrifugal pump and a fan, are features of the cooling system.

Elmore—Of the two-cycle variety the two chassis models offered by the Elmore people for the next year shows several changes, most of which, however, are found in the 46-horsepower model which has a motor of new design in which the cylinders have a double bore and double concentric pistons, the engine being known as the high duty type. This motor is featured by the manner in which cylinder pre-compression is accomplished. The lower portion of the cylinder, where the new charge of gas is

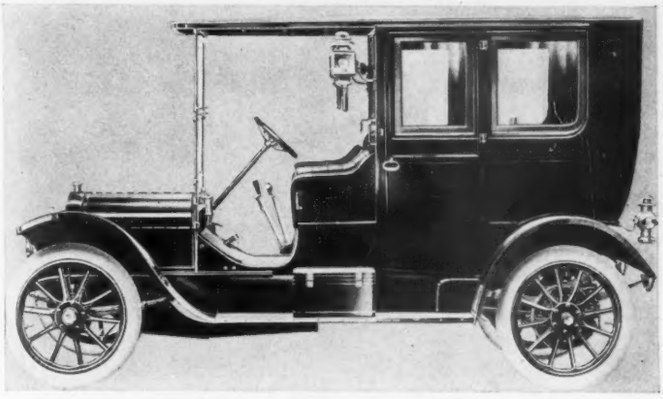


THE CORBIN LIMOUSINE

compressed before being admitted into the explosion chamber, is 6½ inches in diameter while it is 4½ inches in the upper portion where the firing takes place. The cylinders are separately cast and the crankshaft has five bearings. This high duty engine is a patented Elmore feature and its working is described as follows: The incoming gas is drawn into an annular chamber during the entire downward stroke of the piston. The gas passes from the carbureter through the manifold into the distributor, then through the distributer port and pump by-pass, entirely filling the annular chamber. At the same time the gases have been compressed in a chamber which forces the new gas through a by-pass to the distributor which now has changed its position to admit the new gas, and on through ports into the combustion chamber, where upon being compressed the gases are ignited and escape through another port at the conclusion of the down stroke of the piston. There is not time enough to allow an intermingling of the new and old gases and the escape of the exhaust gas through a port has an ejector effect, creating a tendency to draw new gas through a partial vacuum caused by the rapid and complete discharge of the exhaust gas. The incoming gas, through the timing of the inlet port in the shape of the deflector plate on the top of the piston, must first pass to the top of the cylinder, then filling a partial vacuum caused by the exhaust of exploded gases. This same general principle in the control of the incoming gases is used in model 36, which is the running mate to the 46, the two types being almost similar except in the difference in power and a difference in wheelbase, the 36 having 110, the 46 having 120, and in the motors, the 36 having a valveless, the two cycle four-cylinder 36-horsepower engine and the 46 the valveless high duty three-port engine. A variety of bodies is offered and the general features of the two models are a semi-floating rear axle, I-beam front axle, 34 by 4 inch wheels, Atwater Kent generator, ignition device and three-quarter elliptic



MODEL 27 PEERLESS FITTED WITH LANDAULET TYPE OF BODY



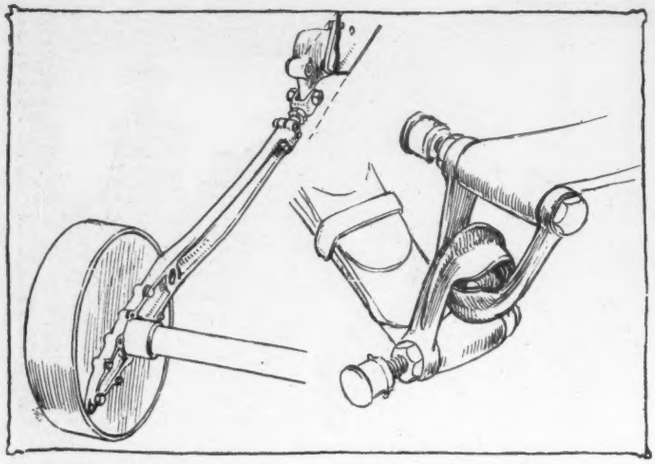
THE WHITE GASOLINE LIMOUSINE

rear springs, semi-elliptic front and shock absorbers both on front and rear.

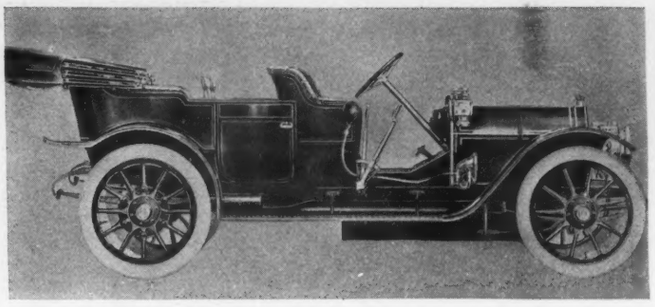
Overland—In the Overland line for 1910 many small changes are to be found. The motor has been increased in power by changing the dimensions of the cylinders from 4 by 4½ inches to a 4¼-inch bore and a 4½-inch stroke. The valves which last year were all on the right side are now all on the left, which, of course, necessitated shifting the carbureter and intake and exhaust piping to the other side as well. More accessibility is obtained this year owing to the fact that the magneto still remains on the right side of the motor, while the carbureter has been shifted to the left. A yoke is now used to hold the inlet and exhaust pipes in place, and the exhaust pipe is now located above the intake pipe, giving freer access to the valves. An improvement also has been made in the push rods in that they are now square instead of round, so that no pins or slots are necessary to keep them from turning, and in addition to this they have been rendered adjustable and noiseless by adding an adjustment with a fiber tip. Instead of the compression oiler previously used lubrication is now maintained by a circulating splash system, with the oil drawn from the sump of the crankcase by an inside plunger pump which is driven off the inlet cam of the rear cylinder. The coupling between the magneto and its driving gear has also been improved this year, which makes assembly easier and allows for any possible misalignment. Larger water manifolds are used in the cooling system and the fan is supported on a bracket which is attached to the base of the motor instead of the front cylinder. Springs are now placed under the leather facing of the clutch, which greatly improves its operation, and the gearset has been made heavier to meet the requirements of the general increase in the size of the car. A torsion tube now encloses the driving shaft, which is designed to take care of the driving and braking strains of the car, so that the torsion rods previously used have been eliminated. The rear axle also is heavier this year, the frame is raised above the rear axle, the full elliptic springs of previous years have been replaced with three-quarter elliptics, and an extra leaf has been added to the front springs. Further increases have been made in the size of the tires and the length of the wheelbase, the wheel dimensions having been changed from 34 by 3½ to 34 by 4 inches, and the wheelbase has been changed from 110 to 112 inches.

Autocar—Prominent in the earlier days of the motor because of the success of the two-cylinder runabout model the Autocar has of late been devoting its main attention to the four-cylinder and for this year has continued practically without change type XX and X-12. This four is of 25.6 horsepower rating, the cylinders being cast separately and 4 by 4½ inches in size, mounted on an aluminum crankcase which has six legs supported by a sub-frame construction. Other well-known features of the Autocar four are that the camshaft and driving gears which run in oil are completely enclosed; the crankshaft is a drop forging mounted in the anti-friction plain bearing while all valves are mechanically operated. Bosch dual system ignition, a positive drive centrifugal pump and a mechanical shaft-driven oiler are other points. The transmission is of the sliding gear type.

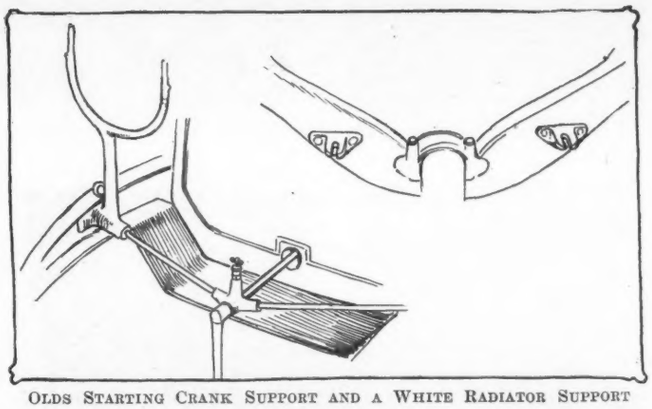
White—For the first time at a New York national show the White gasoline car is on view, but flying colors which are confusing to the lay public, which does not understand how it is possible for the Waltham Mfg. Co. to exhibit the White gasoline car. This, however, is explained when it is known that the White company purchased the license of the Waltham concern and in this way got into the A. L. A. M. and which has refrained so far from changing the franchise to its own name. The new White is featured by a motor of the en bloc type and which is remarkable from the fact that there is an absence of piping around the engine, the intake, exhaust and water manifolds being hidden from view. Because of the White company heretofore having made such a strong advocate of steam there naturally is considerable curiosity expressed by the public over its offering in the gasoline field. A review of the car shows it to be of 20-horsepower and of the long-stroke type, for while the bore is 3¾ inches the stroke is 5⅛, which is longer in proportion than the stroke used by any other American maker, but which simply follows out the foreign practice. Outside of this novel feature the searcher after information finds a cone clutch, a four-speed selective gearset with direct drive on third, shaft drive with two universal joints in the propellershaft, two-bearing crankshaft carried on annular ball bearings, magneto ignition and the motor and gearset supported by three-point suspension system on the cross system of the car frame. The wheelbase is 110 inches. In the steam line the White company has added 6 inches to the wheelbase of its 24-horsepower car, bringing it up to 110 inches, and while this has been done the power plant has been moved back until the condenser now is directly above the front axle instead in advance of it. The engine still is of the



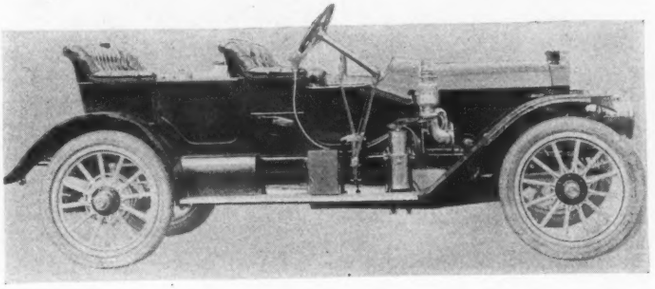
LOCOMOBILE RADIUS ROD AND CADILLAC SPRING SHACKLE



CHALMERS-DETROIT 40 TOURING CAR



OLDS STARTING CRANK SUPPORT AND A WHITE RADIATOR SUPPORT



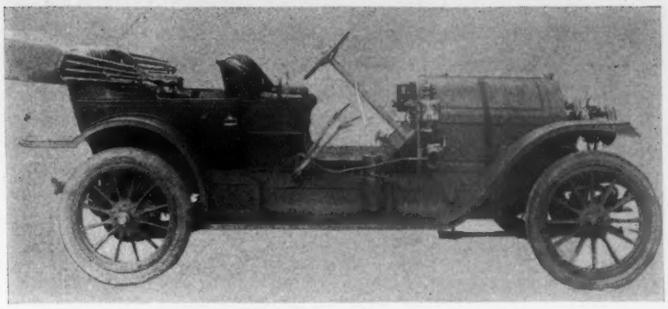
COLUMBIA TOURING CAR

compound vertical type with a 2½-inch bore in the low-pressure cylinder and a stroke of 3 inches. The two pumps which supply water to the generator now are driven from an eccentric, which is located outside of the crankcase at the rear of the engine and which is forged integrally at that part of the universal joint, which is attached to the crankshaft. Heretofore these pumps were driven from a valve gearing. Outside of a more pronounced tilt to the steering column and a change in the shape of the mudguards, the 40-horsepower steamer is about the same as before with the exception probably of the frame being of steel instead of armored wood.

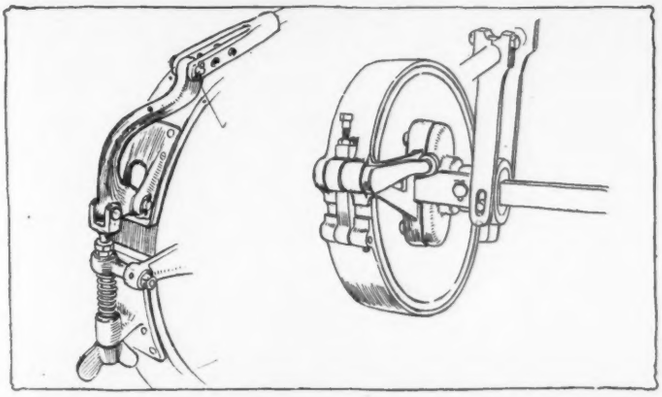
Columbia—For the fifth consecutive year the mark 48 Columbia is offered, the Columbia Motor Car Co. being so well satisfied with the success this model has met since it first came out in 1905 that it has continued it in 1910. A comparison between it and the product of 1909 shows an increase in size and the bore and stroke together with the dependent working parts of the engine. As a protection against dirt and to eliminate noise the valve springs are completely covered, while the crankcase is intended to enclose the front engine gear, which permits of the lubrication of these gears by the splash oiling system, the oil being carried in a compartment which is cast integral with the lower half of the crankcase, there now being a float indicator to show the supply of lubricant. The oil pump is located below the level of the supply, being driven by bevel gears from the rear end of the camshaft and the oil level being regulated by a thumbscrew. The governor is driven by bevel gears from the rear end of the camshaft also. The carbureter is of the float-feed type with a hot water jacket surrounding each mixing chamber, while an automatic air valve is added to the small barrel, the idea being to secure a more uniform mixture. Instead of the round type a square section intake pipe is used, while in addition to the ignition system is the Seeley jump spark scheme with separate set of plugs introduced over the inlet valve in addition to the regular make-and-break system, taking current either from the storage battery or Bosch low-tension magneto. The cone clutch has been increased in diameter and the clutch shoe springs are made adjustable and self-locking. In proportion to the increase in engine power the rear axle housing and all moving parts therein have been increased in size also. Instead of a tubular muffler one of the Powell type has been fitted, while adjustment is facilitated by the placing of the fastening of the mechanism on top of the frame side member.

Mercer—The Mercer is a newcomer this year, and the line consists of three models which will be fitted to a standard chassis except for a few minor changes to accommodate the different bodies. The motor is of the four-cylinder four-cycle type, with the L-type cylinders cast in pairs and the waterjackets cast integral. It is cooled by means of a tubular radiator, a gear-driven water pump, and a belt-driven fan which is adjustably mounted on ball bearings. Lubrication is by means of a circulating splash system with a constant level maintained by a gear pump inside of the oil reservoir. An oil indicator is provided on the crankcase to show the amount of oil in the reservoir. The ignition current of the dual system is supplied by a high-tension Splitdorf magneto and dry cells; and carburetion is by means of a waterjacketed Stromberg carbureter. Transmission from the motor is by means of a disk clutch with forty-two steel plates which run in an oil bath, a selective type sliding gear transmission giving three forward speeds which is equipped with annular ball bearings. There are also shaft-drive with two universal joints, and a rear axle of the semi-floating type. Straight-line drive is a feature of this car, and the driving and braking strains are taken by a triangular torsion rod and two radius rods. The front axle is a one-piece nickel steel forging of I-beam section with a low drop between the springs. The wheels are of the artillery type and equipped with large two-point ball bearings in front, while the rear axle is mounted on ball and roller bearings having a carrying capacity greatly in excess of the load. Brakes are of the external and internal type, acting upon 14-inch pressed steel drums, and they are lined with an asbestos fabric 2 inches wide. The steering gear is of the worm-and-sector type with a hardened bearing and a takeup arrangement for wear or back-lash. A pressed steel frame is employed which is of channel section and offset in front to allow short turning, and a 2-inch raise of the rear axle to bring about the straight-line drive, lower the center of gravity, and to allow for ample spring action. Control of the car is conventional and on the right hand side.

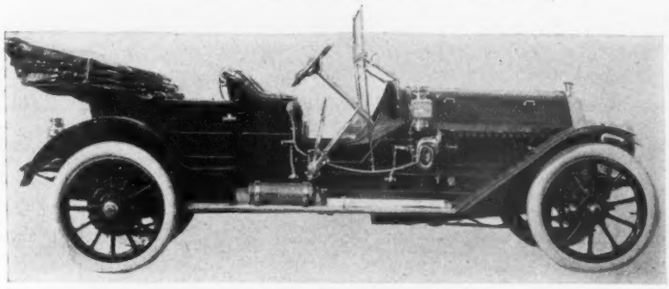
Buick—Although there are no radical changes in the 1910 line



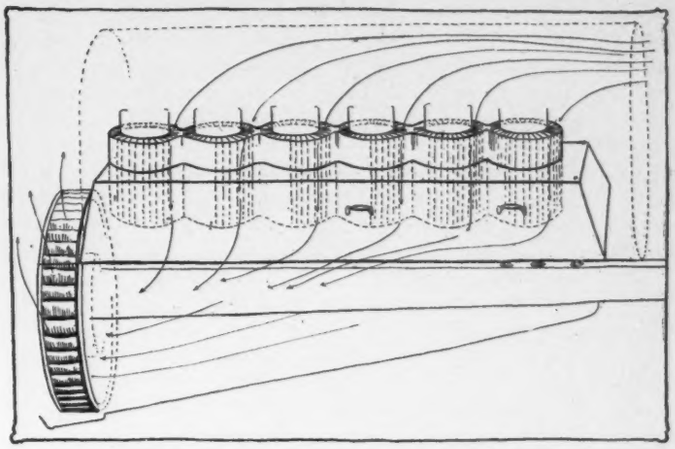
APPERSON JACKRABBIT TYPE



WHITE BRAKE ADJUSTMENT AND APPERSON CLUTCH



THOMAS 6-70 TOURING CAR



SHOWING COURSE OF DRAFT ON FRANKLIN AIR-COOLER

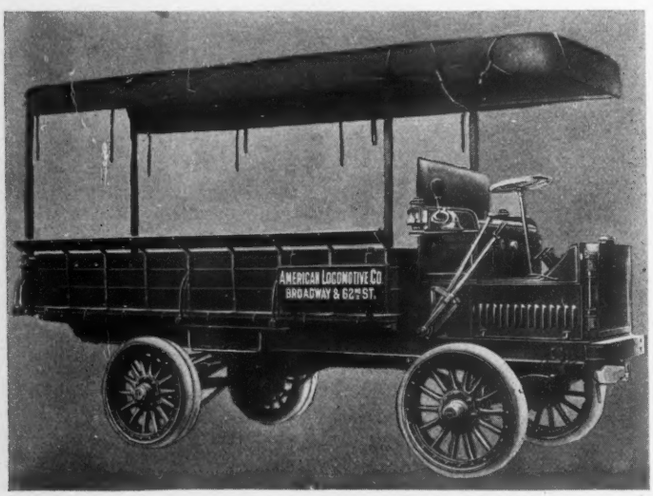
of Buick cars, there have been a number of improvements which add to the general refinement of the product. One change which is common to all cars this year is the adoption of a new vertical tube radiator, which is extremely light in construction but stronger and of greater cooling efficiency. In the model 10 the cooling system has been improved by means of the radiator above mentioned, and the gear pump of last year's model is now replaced by a pump of the centrifugal type. Improvements also have been made in the lubrication system by lowering the level in the crankcase and fitting pipes to the end of the connecting rods, which dip into the oil and conduct it to the connecting rod bearings. The dipping of the oil pipes on the end of the rods is all that is necessary to produce sufficient splash to lubricate the cylinders, and smoking is in this way prevented. Facilities are provided this year for lapping in the pistons before the car is finally tested, which results in a better fit and finish of these parts. The magneto has been slightly changed so that a more intense spark may be obtained at slow engine speed, thus enabling one to run as slowly on the magneto as on the battery. A change also has been made in the driving gear, it being now connected direct to the timing gears, whereas last year it was driven through an idler gear. No other changes are apparent in this model except that the upholstery of the body will be tufted, and the color will be blue with ivory white running gear, instead of the Buick gray previously used. Models 16 and 17 are now fitted with 34 by 4-inch wheels instead of 32 by 4. There also is a new addition to the Buick line for 1910, which will be known as model 19. This is practically a duplicate of the model 17 car except that it is lighter in construction throughout. It has a four-cylinder vertical motor with a 4¼-inch bore and a 4½-inch stroke, and is of the regular Buick valve-in-the-head type. The motor is suspended on a sub-frame, is water-cooled and fitted with jump spark ignition with a magneto and dry cells as a source of current.

Flanders—Coming to the show for the first time, this Detroit product faces the motoring public as a roadster of two and four-passenger capacity, according to the desire of the purchaser. Featured in the designing of this new car is the fact that the tubular underframe carries the motor, radiator, dash, steering gear, pump, magneto and coil on its two parallel tubes, while the transmission is found on the rear axle. The motor of the Flanders is of the four-cylinder variety, with a bore of 3⅝ inches and a stroke of 3¾, giving it a rating of 20 horsepower. The cylinders are cast en bloc and the valves, which are placed on one side, are in pockets and operated from a single camshaft by straight tappets. The waterjacket is cast open and is closed by means of a pressed steel cover, which is fastened by four studs, one at the center of each cylinder head. Inside the crankcase, which is of the barrel type with open ends, is found a crankshaft of the two-bearing type, while the crankshaft bushings are die-cast. The crankshaft is offset while the camshaft is drop forged, with all cams integral. The camshaft and piston pin bearings are of phosphor bronze and the connecting rods are drop forged in I-beam cross section. Here the bearings are of die-cast white metal. The lubrication scheme employed is of the same principle as that used in the E-M-F—a vacuum feed oiler which has no moving part, while oil ducts lead to all bearings and pistons, and the pistons are lubricated by the splash reciprocating parts. In the dual ignition system there is a Splitdorf magneto with a set of dry cells in reserve. The coil, enclosed in a rubber cylindrical case, is placed beside the magneto. Water circulation is maintained by a cylindrical pump which is driven from the magneto shaft. The clutch is a leather-faced cone. The Flanders transmission is of the semi-selective type, affording two forward speeds and reverse. It is made of drawn and stamped steel, while a frame of crucible cast steel bears the two trains of gears and is bolted between the drawn axle sections. Stamped steel plates at the side can be removed and the gears exposed. The standard gear ratio on the Flanders is four to one. Another Flanders feature is that the clutch and service brake are interconnected, so that only one foot lever is required. The wheelbase is 100 inches, the springs semi-elliptic in front and full elliptic in rear, while the wheels carry 32 by 3-inch tires.

E-M-F—No startling changes are announced for the E-M-F for 1910, the car continuing as a 30-horsepower four-cylinder car, with the cylinders cast in pairs and with the waterjackets integral. The valves are all on one side and mechanically operated, the bore being 4 inches and the stroke 4½, while the valves are 2⅛ inches, the valve guides being machined and pressed into place instead of being cast integral with the cylinders. A single camshaft is used with all cams integral, while the crankshaft is offset ¾-inch from the line of cylinders and carries three main

bearings. The flywheel is carried on a flange, which is forged integral with the crankshaft. The lubrication scheme is splash, with an automatic vacuum feed and with the oil reservoir cast integral with the aluminum crankcase. The ignition is the double system, including a magneto and battery, while the cooling is by a large centrifugal pump and a stamped steel fan, which is belt-driven and which is mounted on the radiator. The clutch is of the expanding ring type, leather-faced, and is contained within the flywheel, there being an oil groove in the flywheel with holes drilled for the escape of oil. The transmission is selective sliding, with the gearcase cast integral with the differential housing in the rear axle. This gives three forward speeds. The front axle is of the I-beam type, while in the rear axle the right and left housing sections are drawn from sheet steel and heat-treated. The wheels carry 32 by 3½-inch tires, while the four brakes all act on the rear hubs. The front springs are semi-elliptic and the rear full-elliptic, while the wheelbase is 106 inches.

Alco—In the commercial realm the Alco figures as a 3-ton truck chassis which takes a variety of bodies and which contains a four-cylinder vertical motor which develops 16 horsepower at 800 revolutions per minute. The bore is $3\frac{15}{16}$ inches and the stroke 4¾, while the carrying capacity of the truck is 6,000 pounds. The wheelbase is optional, although the standard length is 110 inches. The loading space on the truck is 11 feet, but the width is optional. Loaded, the height of the frame is 36 inches, while the length over all is 182½ inches. The width of the frame is 41 inches, while the weight of the chassis itself is 145 pounds. The gasoline tank has a capacity of 21 gallons and at 800 revolutions per minute the motor shows 9 miles per hour on the high, 6 miles on intermediate, 3 on slow and 2½ on reverse. Taking up the mechanical features of the truck outside of the motor, one finds fitted an automatic carbureter of the company's own design, jump spark ignition, which includes a Bosch high-tension magneto, multiple disk clutch, a sliding selective transmission, giving three speeds forward and reverse, semi-elliptic springs both front and rear, and a tread which varies, it being 64½ inches in front and 66 inches in rear. Tires are solid rubber, 36 by 5 in front, while in the rear 36 by 3½-inch dual tires are fitted. Hess-Bright bearings are used in the transmission case, differential shaft brackets and in the steering knuckles, while Timken rollers are found in the wheel bearings. The motor bearings are plain anti-friction metal while all gears are of alloy steel.



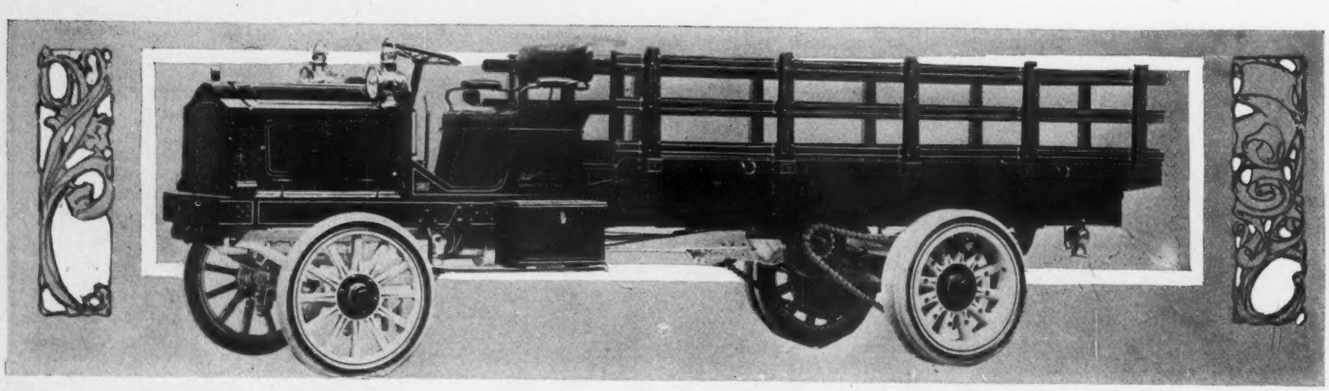
ALCO TRUCK READY FOR COMMERCIAL USE

Alden Sampson—At previous shows the Alden Sampson 20-ton gas electric road train has been exhibited and always has been a feature. This time there are displayed trucks and omnibuses, the feature being a 4-ton truck of 40 horsepower, with a four-cylinder engine with a 5-inch bore and 5½-inch stroke, using a high-tension magneto and battery, thermo-syphon system of cooling, cone clutch, selective sliding transmission, giving four speeds forward, double chain drive and with 36 by 5-inch solid tires on the front wheels and 36 by 4 duals on the rear. The chassis weight is 6,000 pounds and the wheelbase ranges from 146 inches up. The engine is located under the driver's seat and foot boards.

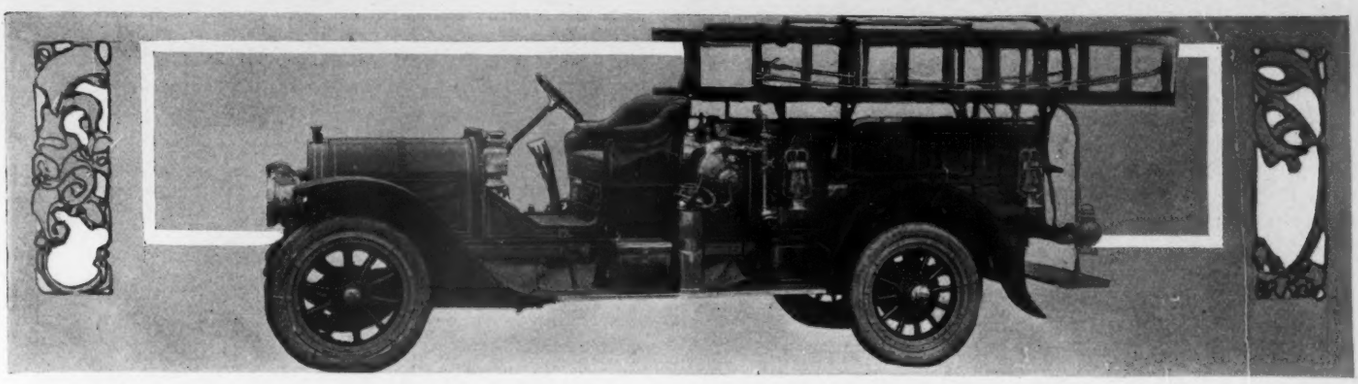
Packard—The Packard 3-ton truck, which is shown as constructed for a prominent Philadelphia concern, is believed to be a good example of the progress that has been made in truck development to meet business requirements in body designing as well as in the mechanical construction of the trucks, the machine being an advance type of commercial vehicle for service in metropolitan, dry goods and general merchandise trade. The motor, which is located under the bonnet at the front end of the chassis, has four cylinders, which are cast in pairs and which have a bore of 4½ inches and a stroke of 5½, showing 24 horsepower at 650 revolutions. The cooling system consists of positive circulation by centrifugal pump and cellular radiator. The ignition uses jump spark with the current supplied by Eisemann magneto and a storage battery for reserve. Lubrication is by splash from the crankcase, while the Packard dryplate clutch is employed. The speed changes are effected by means of sliding gear transmission.

General Electric—Using electricity as its motive power, the General Electric has five commercial propositions—a 1,000-pound delivery wagon, a 2,000-pound delivery wagon, a 2-ton truck, 3½-ton truck and a 5-ton truck. The first three named are credited with 45 miles on one charge, the 3½-ton truck with 40 miles, and the 5-ton, 35 miles. In the 5-ton truck division there are two types, one for the use of brewers and the other a standard truck. The standard truck has a speed of 7 miles per hour, a wheelbase of 138 inches, an over all length of 215 inches and an over all width of 79 inches.

Knox—The Knox is one of the pioneers in the commercial realm and for 1910 its line includes standard chassis of capacities ranging from 1,500 pounds to 7 tons for truck, omnibuses, sightseeing vehicles and fire apparatus of every variety. There are two engines used in this line, one the 40-horsepower found in the model R pleasure car and the other the 48-horsepower of the model M. In all trucks from 3 to 7 tons a special selective type of transmission is used, while in the 2-ton truck there is the same transmission as is found in model R. Throughout the line the motor and clutch are the same as are used in the pleasure cars of



PACKARD 3-TON TRUCK AS IT IS TURNED OUT FOR BUSINESS PURPOSES



POPE-HARTFORD COMMERCIAL VEHICLE WITH FIRE-FIGHTING BODY

the Knox variety. In the 2-ton truck there is no telescoping shaft and no nuts and cotter pins are to be found within the crank case. The countershaft is short and compact, there being less than 6 inches between bearings.

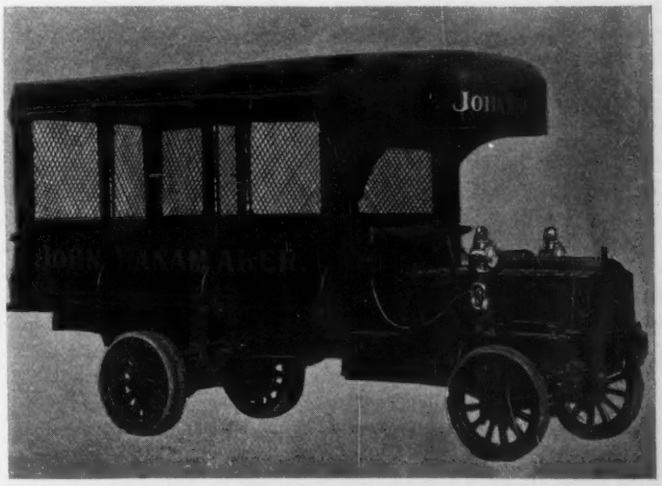
Studebaker—Coming to the commercial proposition, the Studebakers have not made any startling changes of their electric mercantile vehicles whatever, improvements over these machines of a year ago having been put on from time to time during the past 12 months instead of saving them up to spring on the public in a bunch. Whereas there are six distinct types of chassis in this line, all but one follow the same general design, that exception being No. 25, which has a single motor equipment with a differential and jackshaft encased, but with the power transmitted to the rear wheels by a side chain in the same manner as on the other models.

Pope-Hartford—The Pope-Hartford is prepared to meet the demands of the business men with a line of machines which are well adapted to the purpose. The company makes a specialty of fire apparatus, motor ambulances and police patrols, and has them in use in many of the big cities throughout the country. San Francisco recently purchased a combination chemical and hose wagon, a copy of which is on exhibition in the garden.

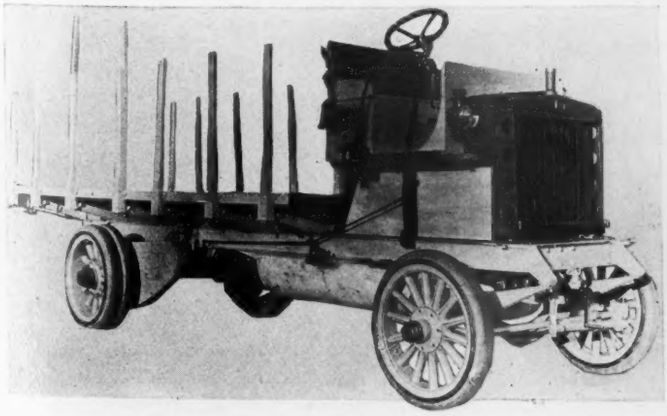
Franklin—Catering to the business men, the Franklin people offer a line of air-coolers which are designed to meet the requirements in the commercial world. In this line is found an opera bus which is on view in the garden, which has a passenger capacity on the driver's seat of two, and six in the interior. The glass frames, toe board and dash are made of Honduras mahogany, while the interior of the car is upholstered with green broadcloth. The equipment includes two dome electric lights.

Autocar—Making one standard chassis, the Autocar fits it with a variety of bodies which includes a hotel station or opera bus, ten-passengers sightseeing car, utility car, an open delivery car with side screens, an open express car, open delivery car with top, two-closed delivery car, furniture car with top, an undertaker's car and an open platform car. Unique in the Autocar construction is the power plant, which is so installed that it is easily removed. The motor and change-speed transmission, with the clutch connecting them, are mounted on a press steel subframe, the front cross member of which extends to the side members of the frame and is bolted to them, while the rear cross member is a semi-circular arch at the top of which is a large clutch securing to a cross member of the main frame. By this system either the motor or transmission may be removed from the sub-frame without derangement of the other. The Autocar uses a two-cylinder four-cycle horizontal opposed type motor, the bore being 4¾ inches, the stroke 4½, and the rating 18 horsepower. Both the valves on the upper side of the cylinders and are mechanically operated.

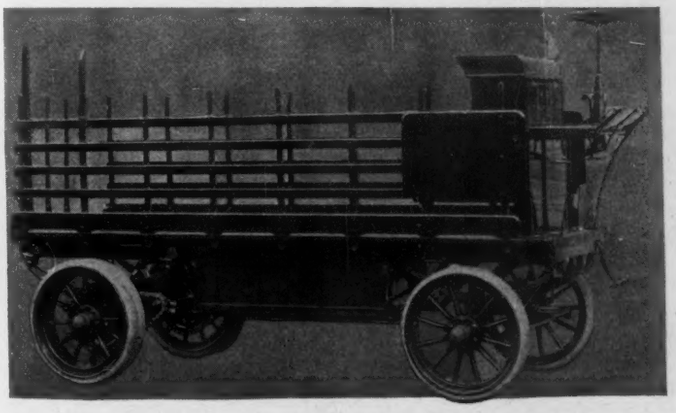
Thomas—Whereas last year the taxicab and town car were the same except as to bodies, this year there has been a segregation, and the town car moves into a separate class, being of about 28 horsepower, with a 4¼ and 5½-inch motor, while the taxicab remains about the same. There are few changes in the taxicab, which continues its 16-horsepower motor with a 3⅜-inch bore and 4⅜-inch stroke and a wheelbase of 104 inches.



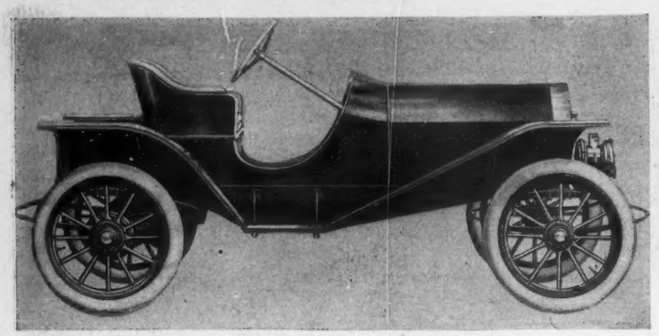
PACKARD TRUCK DESIGNED FOR WANAMAKER



ALDEN SAMPSON'S COMMERCIAL PROPOSITION

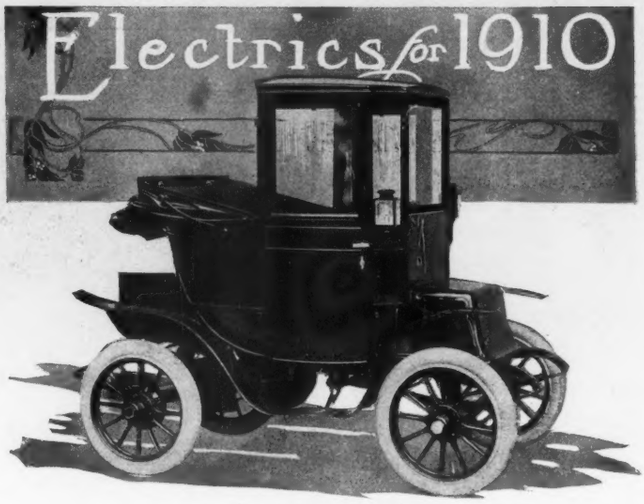


STUDEBAKER TRUCK FITTED WITH STAKE BODY



WAVERLEY IN RUNABOUT FORM

Electrics for 1910



STUDEBAKER WITH BROUGHAM BODY

Woods—In the 214, which is made in A, B and C styles and which is the new model put out for 1910, the I-beam axles which are used both front and rear are made in one piece of chrome nickel steel. The steering mechanism, which is of the inverted Elliot type, is mounted on D. W. F. bearings, which are larger than heretofore, and which are mounted in pairs. The springs are wider, there are thinner plates and more of them in the battery, while to the continuous torque controller both batteries and field coil are connected. Reverse and forward are found in one handle and a cut-off switch interlocks with the controller. The brake is larger and there has been a 12-inch lengthening of the wheelbase, while a new style of hub has been adopted. I-beam distance rods are used and the body, which is wider and longer, seats five comfortably.

Waverley—Differences between the Waverley of today and that of yesterday show that the designers have been busy during the summer. On model 75-C the body has been made 5 inches longer and the wheelbase increased 2 inches, while the wheels are 32 instead of 30. A change also has been made from semi-elliptic springs to full elliptics, while in the motor the iron field rings do not extend the full length of the motor, the end brackets being made of aluminum, which is shaped to allow of easy access to the commutator and brushes. In proportion to its weight there is a large amount of copper in the magnetic circuit which is brought about without sacrificing the amount of iron in it. Also noticeable is that the shaft which is mounted on Hess-Bright and F & S ball bearings, is as large as that used for driving big gasoline cars. These same improvements are found in models 70-C, but succeeding model 67 is model 76, which is of an entirely different design but which has the features of 70-C and 75-C. The Waverley line also includes a roadster which is styled model 78, which in appearance greatly resembles a gasoline car of this type. This is brought about by combining the thirty-two cells in the battery under a long front hood. In contrast with the other Waverley models, which use a side lever unless otherwise ordered, the roadster has a steering wheel, while in the rear of the two-passenger seat is a tool box on which there is a folding rumble seat. The wheelbase is 94 inches and the body length is 108 inches. The driving mechanism of the Waverley line is a transfer shaft-drive attached to the body, incased and protected from dust and dirt and running in a continuous bath of oil. The power is transmitted from the motor through a solid flexible gear to the transverse shaft and then by herring-bone gear to the floating rear axle.

Baker—The Baker for 1910 is distinguished by the adoption of a bevel gear shaft-drive, which is a radical departure from the conventional in electric motor car construction. The bevel drive rear axle is of the semi-floating type, with the bearings of the ball type, while the axle shafts and drive shafts are made from vanadium alloy steel. The differential is of a special type and the differentiating gears are mounted on a three-arm member. The front axle hub is drawn from sheet steel and the front axle spring seats are machined from steel, the tube being of semi-spring temper steel with drop-forged yokes attaching to the tubing by the electric welding process. A Renold type of silent chain is used, while there are two universal joints used in the transmission shafts. Because of the use of a novel shackle on the front ends of the full-elliptic springs, radius rods and the torsion rod are eliminated. The motor is of a special four-pole design, series-wound, and with an unusually large commutator, while the controller is of the continuous torque drum type with six speeds forward and three in reverse, all controlled by one lever. The use of this controller permits of three changes without arching or fusing. There also is a safety device which prevents the slipping into reverse and shutting off power. By moving the front axle forward an 80-inch wheelbase has been secured, while the standard battery equipment for victorias and coupes has been increased from twenty-four cells to twenty-eight, 9-V exide, in series of all speeds. There are three brakes fitted.

Rauch & Lang—Instead of giving the customer only the choice of three colors, which is the custom with some manufacturers of electrics, new tactics have been adopted by the makers of the Rauch & Lang in that they give the customer his or her choice of color and upholstery. Changes between 1909 and 1910 do not involve the car mechanically, the difference being found in the body. The 1910 offering is a larger car all around, the wheelbase having been lengthened from 83 to 85 inches, while it will be found that the interior of the body has been increased several inches in size, all of which will be appreciated by the user of the vehicle. In addition to this the company is bringing out a different body with a new style front. In general detail the chassis in this line resemble those used in the conventional electric, exide batteries being used and the Palmer web tire being standard equipment. The wheels are 32 inches in diameter when pneu-

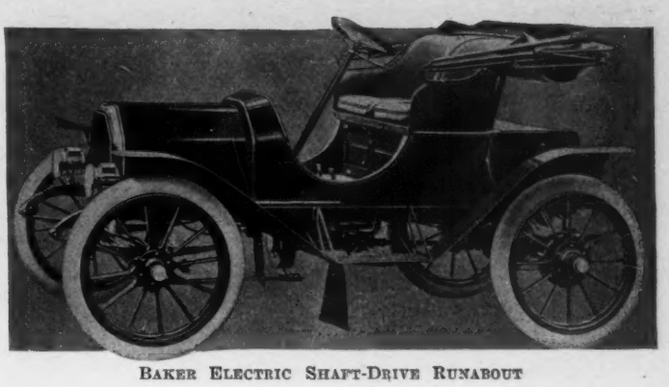
THE WAVERLEY BROUGHAM

BAKER OF THE EXTENSION FRONT TYPE

maties are used and 34 when fitted with Motz cushion tires. The frame is cold pressed steel and is so constructed that it is possible to change the bodies to suit the various seasons of the year. The drive is by tube side chains direct to the wheels, which are mounted on a stationary rear axle. The driving power is generated by a unit placed above the spring which guards against road shocks. The countershaft motor controller and controlling devices are mounted on a single manganese bronze casting or subframe, which latter is suspended from the steel frame at three points. Imported annular ball bearings are used throughout, while the motor is of the multipolar type.

Detroit—The two Detroit electric chassis for 1910 carry nine different types of bodies, the double-chain drive chassis being designed for the brougham while the direct-drive chassis is designed for roadster use, the feature of this being that the motor is placed close to the rear axle. The leading feature of the improvements made in this line is to be found in the braking system, where is placed an automatic cut-off brake by the application of which power is cut off. Then, too, the controller lock is more conveniently placed while the spring equipment permits of the use of either penumatic or solid tires, the manufacturers, however, giving the preference to the pneumatic. All the way through the line it is noted that luxuriousness of equipment has been the keynote, the result being a general refinement which appeals most strongly to the users of this type of locomotion. In the rearrangement of the power plant by which the motor is dropped below the floor of the car, it is claimed that the scheme eliminates motor noise inside the body, lowers the center of gravity and allows of the equipping of substantial emergency countershaft brake. Another feature is that the steel cross members supporting the batteries on both chassis have been so rear-

THE WOODS OFFERING FOR 1910



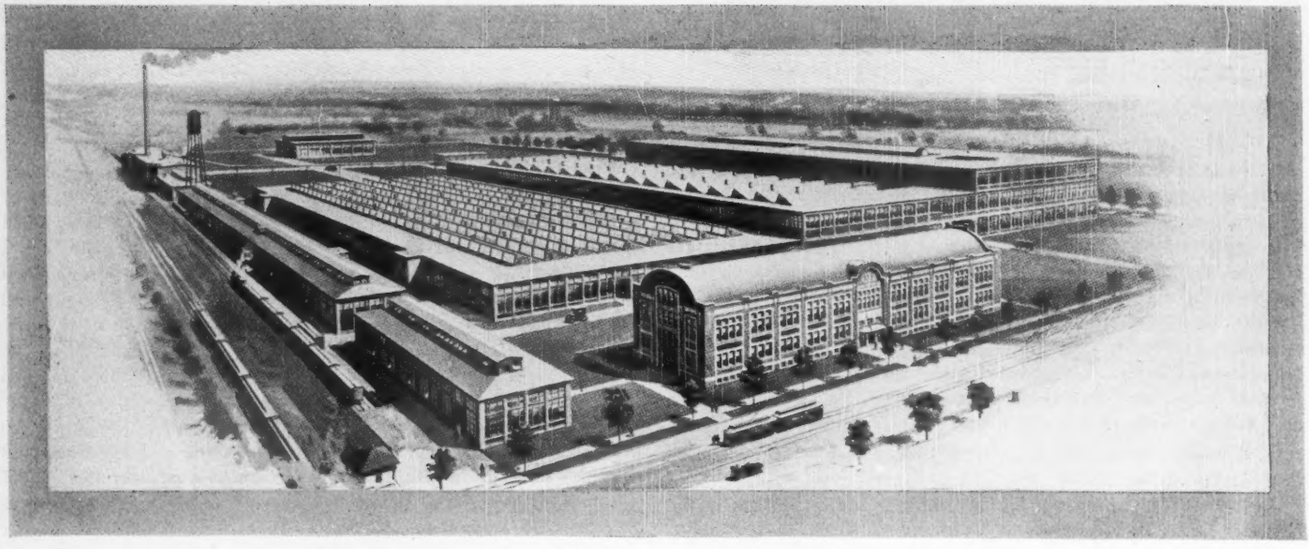
BAKER ELECTRIC SHAFT-DRIVE RUNABOUT

ranged that any one of the models can be equipped with either the present lead or the new type of Edison battery. The power plant consists of 2½ horsepower mulitpolar series-wound motor in combination with a short countershaft, rear axle and torsion rod on one chassis and on the other it is 3 horsepower used in combination with a tubular steel countershaft housing and a cast aluminum chain case.

Studebaker—New in the Studebaker line of electric pleasure cars are two models known as 17, while 22-F is a continuation of an old model but of somewhat different lines. This last-named model has a wheelbase of 67 inches, the wheels being 30 inches in diameter. The motor, of the Westinghouse type, is suspended from the frame of the body and is mounted on Hess-Bright ball bearings, there being a 24-11 P. V. exide battery, eight cells being placed in the front and two divisions of eight cells each in the rear. The 17-B coupe, one of the newcomers, is of the extension front type and possesses four-passenger capacity. It is of roomy proportions and has an extreme length over all of 107½ inches and height of 104 inches, which gives 24 inches of leg room and a seat 42 inches in width and 19¼ inches deep. On this model the battery consists of twenty-six 11-N. V. exide cells, two groups of five cells each being placed at the front and two groups of eight cells each at the rear. The Westinghouse motor is 46 volt 6 ampere and is suspended from the chassis frame and is regulated by a Studebaker continuous torque controller having four speeds and shunt forward and three speeds reverse. The wheelbase is 71 inches and the wheels 30 inches in diameter. The phaeton differs from the coupe only in having a small child's seat for carrying a third person. The entire line is noted for the luxurious fittings of the bodies.

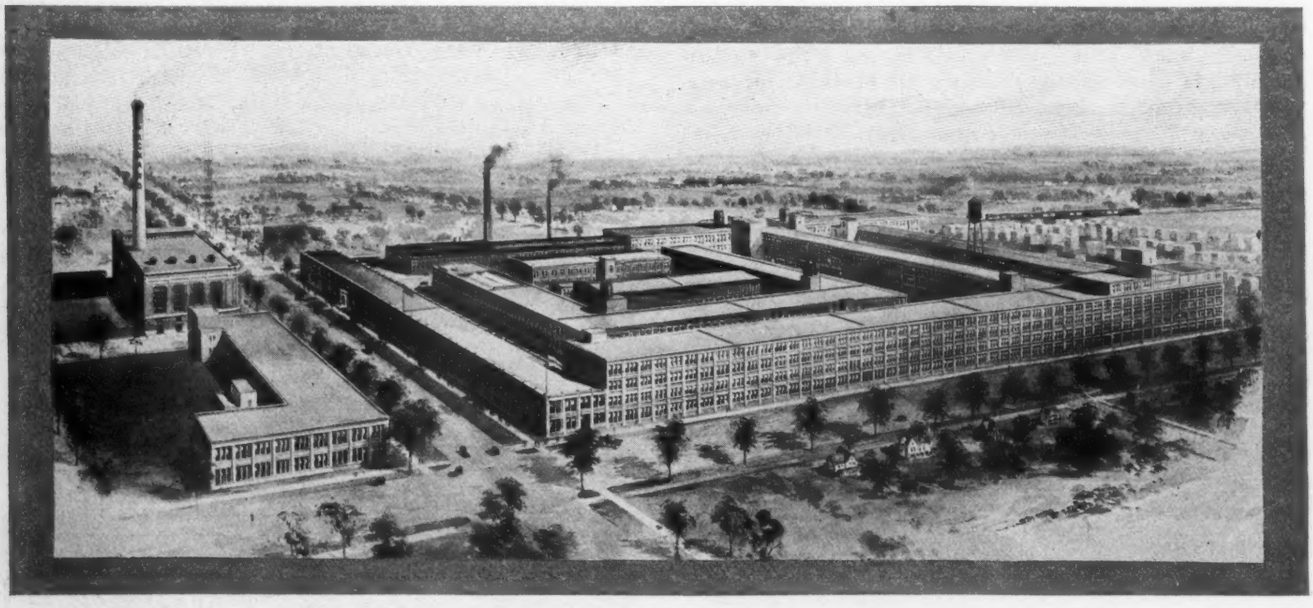
Columbia—The victoria-phaeton Columbia is of the conventional type with a 70-inch wheelbase, a 48-inch tread and carrying 30-inch rears. It carries an exide battery grouped in special high-bridged jars, there being twenty-four cells in the battery. The motor is of the General Electric type series-wound and 48 volts, developing 3.5 brake horsepower. Chain drive is utilized and the steering is by hinged side lever. Hess-Bright ball bearings are used in the wheels. Pneumatic tires are fitted and are of the quick detachable type. The Columbia extension-front brougham has a wheelbase of 86 inches and the wheels are 32 and fitted with pneumatics. A special General Electric high-speed motor of 80 volts 55 amperes is used and the transmission is of the solid helical type with a double gear reduction. The battery is carried in a single tray beneath the body, being suspended at each end by hooks which are in turn carried on rocker joints fast in the body. This makes it possible to remove the battery easily, all that is necessary to do being to run the vehicle over the lift and raise the plunger until the battery is lifted off the hooks. When this is done the whole vehicle will rise slightly. Pulling back the leverage at each end of the battery compartment disengages the body hooks from the battery so that it can be lowered from the body.

PROGRESS of the



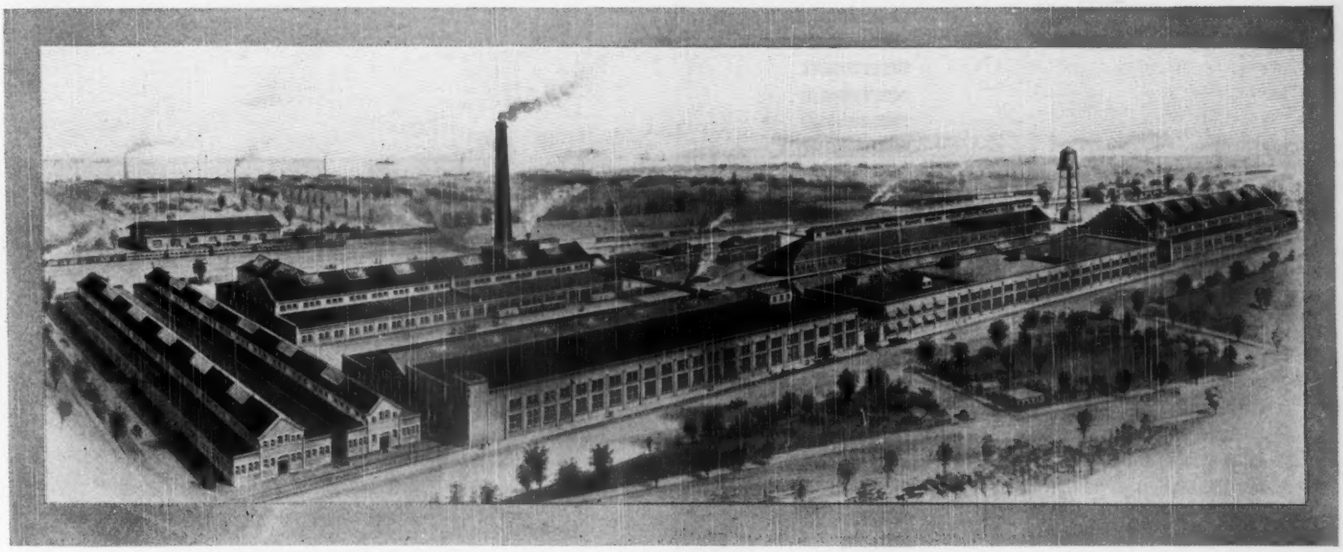
PIERCE-ARROW'S PLANT AT BUFFALO IS A MODEL OF ITS KIND

WERE King Solomon alive at the present time there is a strong possibility that instead of writing "Of making many books there is no end," he doubtless would declare "of making motor cars there is no end." This is an age of transportation and the motor car is in the limelight of the transportation world at the present time. It has been asked, and asked quite frequently, what have been the big transportation epochs of the centuries, and with turning too far back in the annals of transport record it will immediately become apparent that although transportation in the most accepted sense applies to moving human beings, merchandise, raw materials, and other matter from place to place, yet in the broader sense the transportation of the human voice in the telephone of today, the transportation of dots and dashes in the telegraphy and cable codes, the



PACKARD COMPANY HAS IN OPERATION A FACTORY AT DETROIT THAT IS WELL EQUIPPED FOR ITS WORK

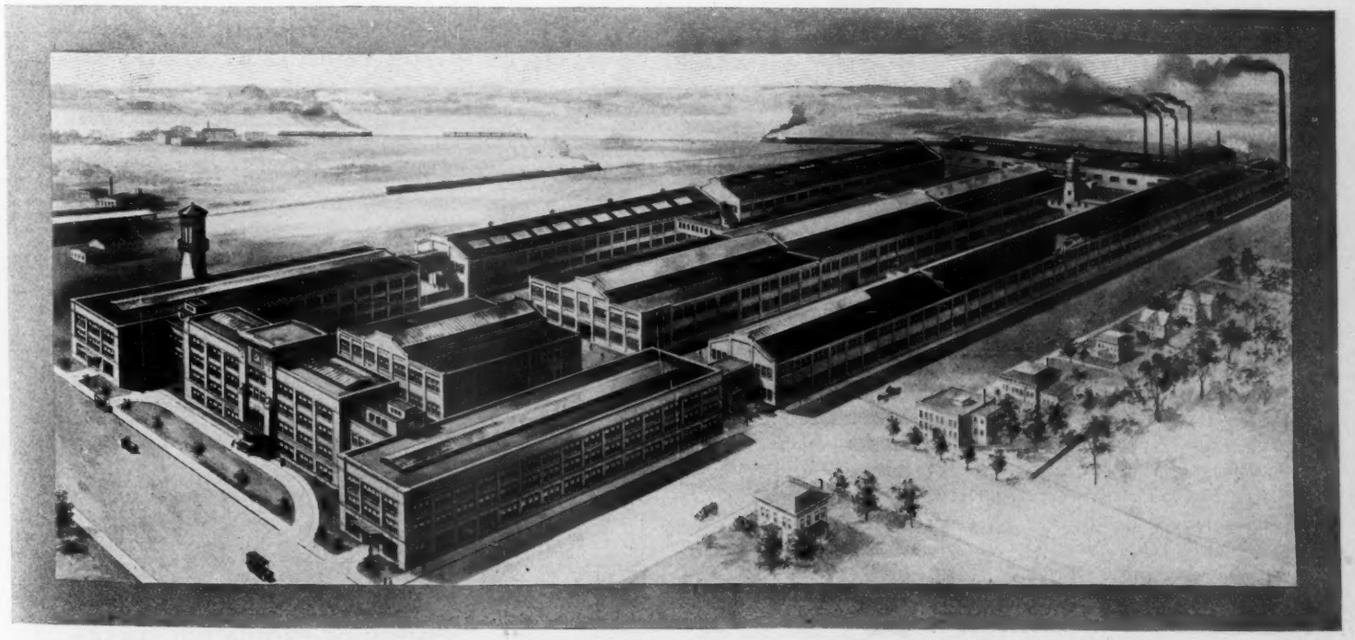
MOTOR CAR INDUSTRY



THE WINTON MOTOR CARRIAGE CO.'S PLANT AT CLEVELAND, OHIO, THE HOME OF THE WINTON SIX

transportations by wireless of the telegraphy and cable codes, the wireless transmission of the human voice, the transmission by electric current of photographs, and a score of other phases, are aspects or accomplishments of transportation and show sufficiently what a role transportation has played and is playing today in the moving along of this old world towards its inevitable perfection of attainment.

The invention of the steamboat, the centennial of which was celebrated in New York during the past fall; the debut of the railroad train toward the end of the first quarter of the nineteenth century; the flashing of the news by telegraph in the fifties; the introduction of the telephone later; the motor car toward the end of the last century, and the attainments of the aeroplanes within the last 2 years constitute epochs that are history-



THE PEERLESS FACTORY AT CLEVELAND, IN WHICH THE PEERLESS PRODUCT REACHES ITS MATURITY

NUMBER OF MAKES OF MOTOR CARS IN THE UNITED STATES

No. of Makes	Cities
25	Detroit, Mich.
14	Chicago, Ill.
12	Indianapolis, Ind.
10	Cleveland, Ohio
8	St. Louis, Mo.
7	Buffalo, N. Y.
7	New York, N. Y.
7	Cincinnati, Ohio
6	Milwaukee, Wis.
5	Auburn, Ind.
4	Hartford, Conn.
4	Dayton, Ohio
4	Springfield, Mass.
4	Pontiac, Mich.
4	Massillon, Ohio
3	Jackson, Mich.
3	Anderson, Ind.
3	Syracuse, N. Y.
3	Pittsburg, Pa.
3	York, Pa.
3	Elkhart, Ind.
3	Evansville, Ind.
3	Grand Rapids, Mich.
3	Flint, Mich.
2	Brooklyn, N. Y.
3	Reading, Pa.
2	Racine, Wis.
2	Toledo, Ohio
2	Philadelphia, Pa.
2	Atlanta, Ga.
2	South Bend, Ind.
2	Kokomo, Ind.
2	Lansing, Mich.
2	Rochester, N. Y.
2	Adrian, Mich.
2	Pittsfield, Mass.
2	Jackson, Tenn.
2	Long Island City, N. Y.
2	Minneapolis, Minn.
2	Amesbury, Mass.
2	Moline, Ill.
2	Los Angeles, Cal.
2	Denver, Colo.
2	Providence, R. I.
2	Columbus, Ohio

THE FOLLOWING CITIES PRODUCE ONE MAKE EACH

NEW YORK
Goshen
Dansville
Tarrytown
Newark
Watertown
Lockport
Owego
Poughkeepsie

MASSACHUSETTS
Beverly
South Easton
Orange
Waltham
Brockton
Stoneham
Chicopee Falls
Worcester
Boston
Newtonville
Newton

PENNSYLVANIA
Ardmore
Pottstown
Lenover
New Kensington
Wilkes-Barre
New Castle
Bryn Mawr
Beavertown
Allentown
Lititz
Brookville

OHIO
Middletown
Miamisburg
Clyde
Chillicothe
Elyria
Norwalk
Carthage
Portsmouth
Springfield
Plymouth

INDIANA
East Chicago
Knightstown
Peru
Muncie
Mishawaka
Shelbyville
Franklin
Garrett
Ligonier
North Webster
Albany
Decatur
Ridgeville
Richmond

NEVADA
Reno

ILLINOIS
Peoria
Oregon
Springfield
Joliet
Fairbury
Lincoln
Danville
McHenry
Harvey
Elgin
Kankakee

KENTUCKY
Lexington
Owensford

MINNESOTA
Luverne
Crookston
Columbus Heights
Mankato

CONNECTICUT
New Britain
Bridgeport
Bristol

MARYLAND
Hagerstown
Baltimore

NEW JERSEY
Elizabeth
Trenton
Newark

KANSAS
Hutchinson
Topeka

MICHIGAN
Muskegon
Dowagiac

CALIFORNIA
San Jose

NEBRASKA
Omaha
Angus

IOWA
Dubuque
Kellogg
Des Moines
Davenport
Hampton
Ottumwa

WISCONSIN
Eau Claire
Kenosha
Hartford
Oshkosh
Columbus

TEXAS
Houston

NORTH CAROLINA
Asheville

NUMBER OF PRODUCING CITIES, 145
NUMBER OF MAKES PRODUCED, 290
End of 1909

NUMBER OF MAKES OF MOTOR VEHICLES BY STATES

No of Makes	Cities
45	Michigan
44	Indiana
39	Ohio
32	New York
27	Illinois
21	Pennsylvania
19	Massachusetts
13	Wisconsin
8	Missouri
7	Connecticut
7	Minnesota
6	Iowa
3	New Jersey
3	California
2	Colorado
2	Rhode Island
2	Kentucky
2	Tennessee
2	Maryland
2	Kansas
2	Nebraska

THE FOLLOWING STATES PRODUCE ONE MAKE EACH

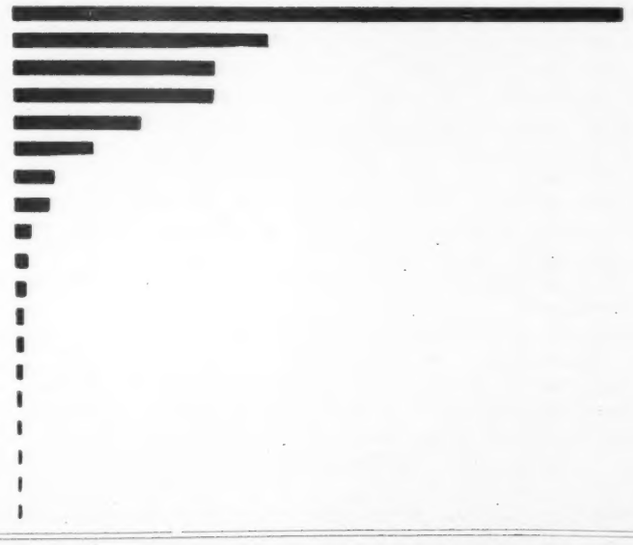
Texas Nevada North Carolina

NUMBER OF PRODUCING STATES, 24

GASOLINE PLEASURE CARS TO BE PRODUCED BY CITIES IN 1910

	Cars	Value	Pos.
MICHIGAN	161,216	$202,910,000	1
OHIO	40,150	79,819,500	2
INDIANA	35,915	46,410,750	4
NEW YORK	31,112	66,634,500	3
WISCONSIN	9,980	14,987,500	7
ILLINOIS	9,355	15,857,000	6
PENNSYLVANIA	7,325	23,809,000	5
IOWA	4,590	9,860,000	9
CONNECTICUT	4,000	12,545,000	8
MISSOURI	3,950	9,800,000	10
MASSACHUSETTS	2,950	6,917,000	11
MINNESOTA	565	305,000	17
MARYLAND	525	1,283,750	13
KENTUCKY	480	600,000	15
TENNESSEE	300	360,000	16
KANSAS	300	795,000	14
RHODE ISLAND	300	1,500,000	12
NEBRASKA	250	250,000	18
COLORADO	50	125,000	19
NEW JERSEY	40	89,500	20
NEVADA	10	25,000	21
GEORGIA	10	5,000	22
	313,373	$494,888,500	

GASOLINE PLEASURE CARS TO BE PRODUCED BY STATES IN 1910



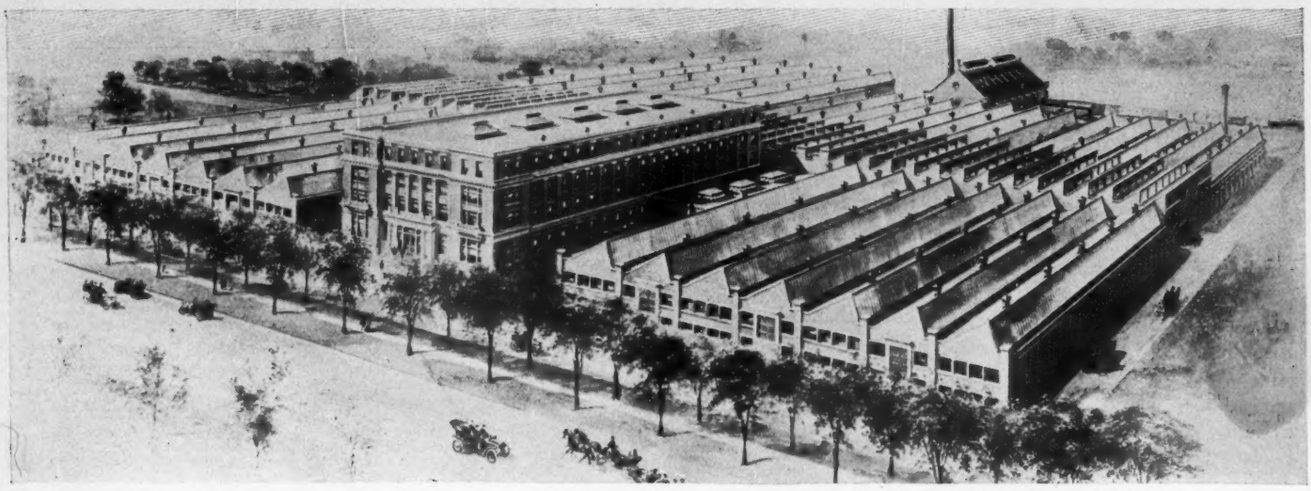
	Cars	Value
DETROIT, MICH.	99,246	$115,136,000
FLINT, MICH.	41,000	54,800,000
INDIANAPOLIS, IND.	32,300	42,335,000
CLEVELAND, OHIO	32,200	53,207,000
TARRYTOWN, N. Y.	20,000	25,000,000
LANSING, MICH.	12,520	19,000,000
RACINE, WIS.	6,600	8,050,000
BUFFALO, N. Y.	5,900	26,485,000
MOLINE, ILL.	4,100	7,375,000
ST. LOUIS, MO.	3,950	9,800,000
DAYTON, OHIO	3,800	9,700,000
PONTIAC, MICH.	3,800	5,349,000
JACKSON, MICH.	3,500	6,125,000
YORK, PA.	3,100	7,800,000
DES MOINES, IOWA	2,750	3,990,000
STREATOR, ILL.	2,500	4,100,000
KENOSHA, WIS.	2,200	4,725,000
CHICAGO, ILL.	2,155	2,974,500
SPRINGFIELD, MASS.	2,100	5,755,000

THE FOLLOWING CITIES WILL PRODUCE 2000 OR FEWER CARS IN 1910

MICHIGAN—	Cars	Value
Grand Rapids	50	$ 200,000
Muskegon	800	1,400,000
Saginaw	300	900,000
INDIANA—		
Auburn	1,700	2,040,000
Anderson	1,300	1,050,000
Knightstown	15	15,750
Elkhart	600	970,000
NEW YORK—		
New York	1,562	6,851,000
Syracuse	2,000	5,072,000
Rochester	550	1,337,000
Dansville	100	127,000
Newark	1,000	1,762,000
PENNSYLVANIA—		
Ardmore	400	700,000
Pittsburg	100	525,000
Pottstown	1,300	7,540,000
Lenover	25	30,000
New Kingston	150	475,000
Wilkes-Barre	1,000	3,200,000
Reading	450	960,000
New Castle	100	210,000
Bryn Mawr	700	2,359,000

IOWA—	Cars	Value
Dubuque	20	64,000
Davenport	20	40,000
Ottumwa	1,800	5,766,000
MASSACHUSETTS—		
Beverly	200	222,000
Orange	200	500,000
Waltham	300	135,000
Brockton	50	55,000
Stoneham	100	250,000
ILLINOIS—		
Peoria	500	1,250,000
Springfield	100	157,500
CONNECTICUT—		
Hartford	2,000	5,500,000
New Britain	500	1,375,000
Bridgeport	1,500	5,670,000
OHIO—		
Cincinnati	550	1,012,500
Columbus	2,000	3,200,000
Massillon	600	9,700,000
Elyria	1,000	3,000,000
WISCONSIN—		
Eau Claire	10	70,000
Milwaukee	550	887,500
Hartford	500	1,111,000
Waukesha	120	144,000

MINNESOTA—	Cars	Value
Luverne	15	30,000
Crookston	50	75,000
Minneapolis	200	200,000
KENTUCKY—		
Lexington	480	600,000
TENNESSEE—		
Jackson	300	360,000
KANSAS—		
Topeka	300	795,000
RHODE ISLAND—		
Providence	300	1,500,000
NEBRASKA—		
Angus	250	250,000
COLORADO—		
Denver	50	125,000
NEVADA—		
Reno	10	25,000
NEW JERSEY—		
Trenton	40	89,500
MARYLAND—		
Hagerstown	500	1,215,000
Baltimore	25	68,750
GEORGIA—		
Atlanta	10	5,000



FACTORY OF THE WHITE CO., CLEVELAND, WHERE WHITE STEAM AND GASOLINE CARS ARE DEVELOPED

making in their importance. By far the greater transportation epoch of the present youthful century is the perfection of the motor car and its universal adoption from one boundary of the country to another and through the length and depth of the land. The motor car may be termed the private train of the business man, if he has sufficient leisure time to tour the country or spend a few summer months in Europe or amid the cool airs of our own eastern hills. To the city resident who uses it to go to and from his place of business it becomes his private trolley car; and to the man whose time is too valuable to wait for the next train to a city a few miles away the motor car immediately becomes the special limited that goes as soon as the owner is ready.

Growth of Motor Industry

So enormous has the present motor car industry become that at the close of 1909 conservative estimates place the number of motor cars owned in this country at one car to every 187 population, and, taking a rough division, by calling one-third of these men, the car population works out at one to every fifty men. By statistics given out by many makers it is calculated that for 1910 that if the cars contracted for can be built during the year that the grand total of 313,373 machines will be constructed, and that if these were paid for in $1 bills, and these bills were placed end to end, they would form a ribbon that would girdle this globe two and one-third times at the equator. On the other hand, if all of these cars were paid for in silver dollars the manufacturers would have as their receipts a trainload of silver consisting of 729 cars, each car carrying its full capacity of 40,000 pounds, and these cars, end to end on one track, would constitute a train 4⅔ miles in length. It is an enormous industry, so enormous that few ever pause to weigh its immensity or even dwell on its magnitude in comparison with other industries which we have considered to be mammoth in comparison with the manufacture of motor cars, whereas after a few moments of investigation the opposite proves to be true.

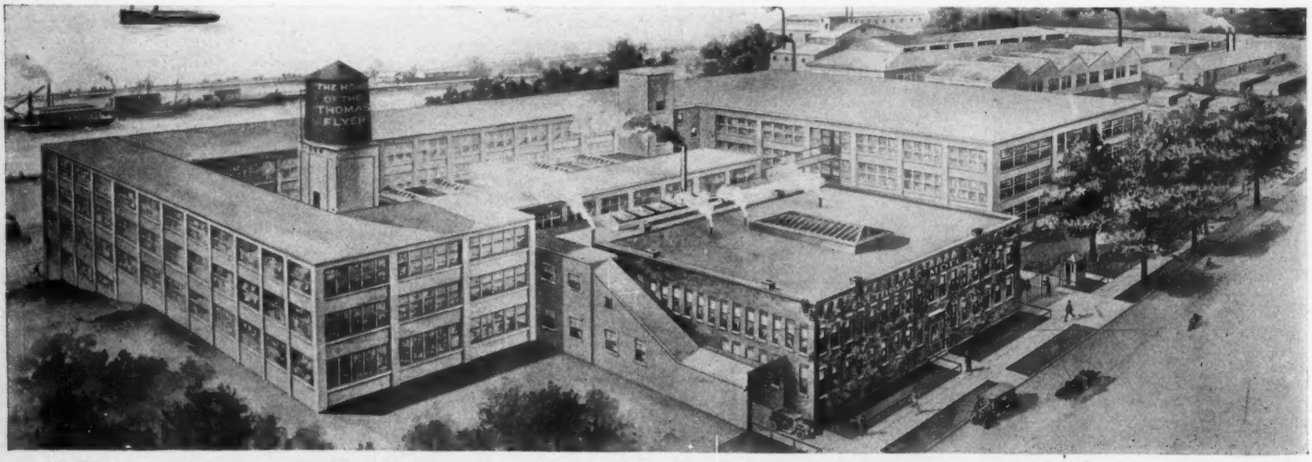
In compiling statistics to cover the production of motor cars in the United States, Motor Age has been greatly handicapped through a lack of information of a reliable nature. Blanks were sent out to all manufacturers of pleasure, commercial and high-wheeled vehicles, as well as to the makers of tires and other parts of the cars, but the results seem to show a great hesitancy on the part of the producer to give desired information which would be exceedingly interesting to the general motor car buying public.

Some of the producers responded readily and gave full details of a confidential and non-confidential nature, but the failure to do so on the part of many is readily seen from the following list of blanks sent out:

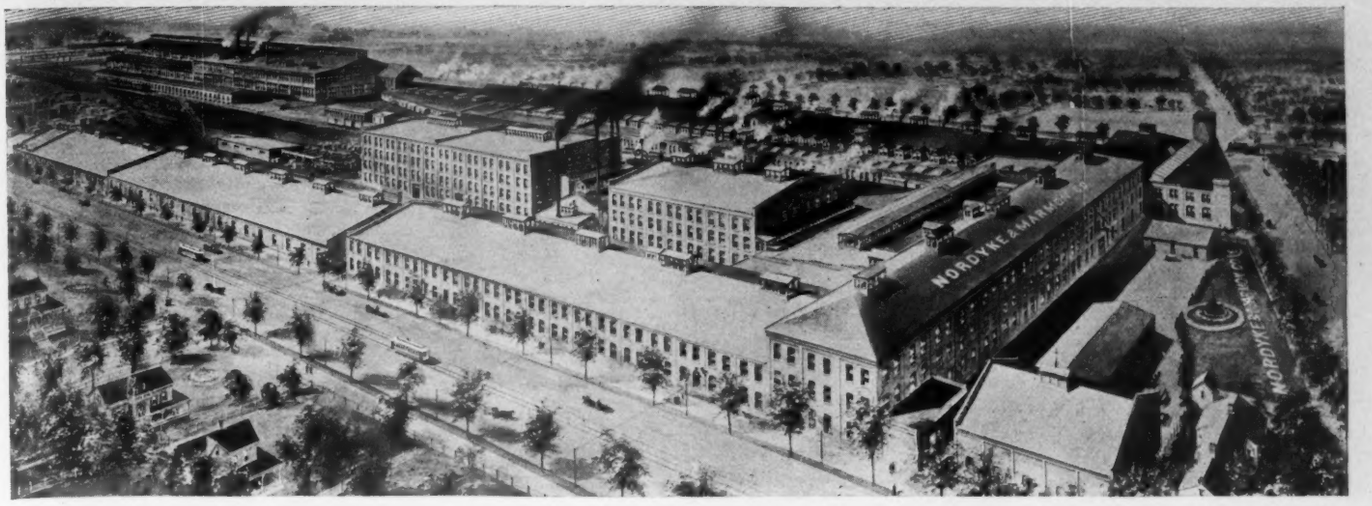
	Total number	Replies
Gasoline pleasure cars	156	33
Electric and steam pleasure cars.	24	3
Motor buggies	41	4
Commercial cars	71	4
Tires	17	5
Batteries	47	1
Axles	33	3
Wheels	5	1
Springs	10	1
Ignition	29	3
Specialties	30	2
Carbureters	22	1

Interesting Facts Compiled

It will be noted that quite a number of the gasoline pleasure car manufacturers replied, and from these replies very valuable statistics have been compiled and the other manufacturers average from this information, so that fairly reliable statistics have been compiled. The principal volume of statistics, therefore, deals principally with the gasoline pleasure car; but many interesting facts have been gathered in regard



BIRTHPLACE OF THE THOMAS FLYER CARS, THE E. R. THOMAS CO.'S FACTORY AT BUFFALO, N. Y.



NORDYKE & MARMON PLANT AT INDIANAPOLIS, IND., WHERE MARMON CARS ARE CONSTRUCTED

to other branches of the motor car industry in this country.

At the end of 1909 the locality of manufacture of motor-driven vehicles is rather widely scattered throughout the United States, and the chart, page 60, gives a graphic illustration of the geographical situation of the industry. The number of states represented in the industry is twenty-four, whereas there are 145 cities as homes of one or more manufacturing concerns. The 290 different makes of cars are thus scattered through the country. Among the states Michigan comes first with forty-five different makes of cars, followed by Indiana a close second with forty-four makes. Ohio with thirty-nine, New York with thirty-two, Illinois with twenty-seven, Pennsylvania with twenty-one, Massachusetts with nineteen and Wisconsin with thirteen constitute the principal states and they are followed by sixteen others of more or less activity.

Although Michigan is closely followed by Indiana in the order of states, Detroit, Mich., far outreaches any other city in the number of different makes, having twenty-five, and Chicago follows next with but fourteen, and the list rapidly shows a decreasing number, until finally we have 100 cities with but one make each.

When it is remembered that previous to 1902 there were not to exceed five or six different makes of cars in the United States, and that in 7 years the number has jumped to 290, the mind does not fully grasp the magnitude of this new trade. Some of the makers in the field previous to 1902 were Duryea, at Reading, Pa.; Locomobile, at Bridgeport, Conn.; Knox, at Springfield, Mass.; Apperson, at Kokomo, Ind.; Haynes, at Kokomo, Ind.; Olds, at Detroit, and Columbia, at Hartford, Conn. These pioneers little dreamed of the proportions the industry was to reach in a few short years.

As recently as 1906 the average person of this country thought that motor cars were simply a fad and that they would soon lose out among pleasure-seekers as did the bicycle; but no person now can doubt the certainty that the car has come to stay after reading of the extent to which it has grown and the money which has been put into the business.

Big Features Encountered

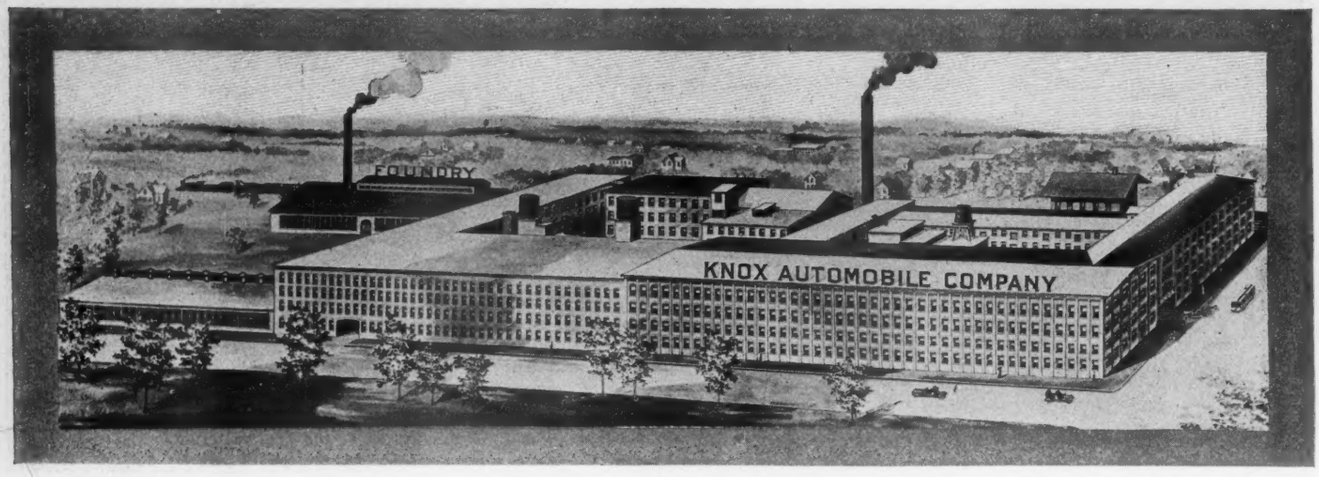
Turning now to the pleasure cars only, considering them as a separate industry, we meet with some big figures. Considering the gasoline pleasure cars alone to begin with, we find that there are 156 different makes, distributed in seventy-five cities in twenty-two states. This does not touch the high-wheeled motor buggies, electric or steam pleasure cars, which go to form another large group of themselves.

Referring to the chart, page 60, we see that among the states Michigan is far ahead, both in numbers of cars produced and in the value of the output. It is followed by Ohio with about one-fourth the number, and then by Indiana and New York, which are both close to Ohio in numbers. These four states stand out as the heavy producers and none of the other states compares with them in the industry. Out of the twenty-two states we find half of them producing more than 2,000 cars each, with Michigan's 161,216 cars standing far and above the rest and equal to all of the rest of the states put together. This shows an enormous concentration of manufacturing in this one state, with the heavy investment of a capital to turn out a year's product worth $202,910,000, according to calculations.

The grand total of cars to be produced in 1910 by the United States shows 313,373 cars, valued at $494,888,000, for the gasoline pleasure cars only.

Think of the few hundred cars in 1902 as compared with this, for here we have a parade, which if the cars were placed

PREMIER MOTOR MFG. CO. ALSO HAS A LARGE PLANT AT INDIANAPOLIS, IN WHICH "THE QUALITY CAR" IS DEVELOPED



KNOX COMPANY, OF SPRINGFIELD, MASS., IS ONE OF THE OLDEST MANUFACTURERS OF MOTOR CARS IN THE UNITED STATES

tightly end to end would reach for 653 miles, and if the parade were to pass a given point at the rate of 12 miles per hour it would be 55 hours in passing.

Figuring the 1909 Output

Figuring the 1909 output at 100,000 and previous cars on duty at 50,000, we here have a car for one out of every 187 people in the United States, and if about one-third of these were men we have the astonishing figure of one car for each sixty men. The question immediately suggests itself, "How long before they will each have one?" The writer feels that he has not exaggerated the figures in the least in the individual items; but when the sum total is taken the result is certainly astonishing.

The floor space in use by the factories to produce these cars would cover a space nearly 1 mile square, being in area 640 acres. The number of people now employed in these factories, if they joined hands, would stretch for 100 miles.

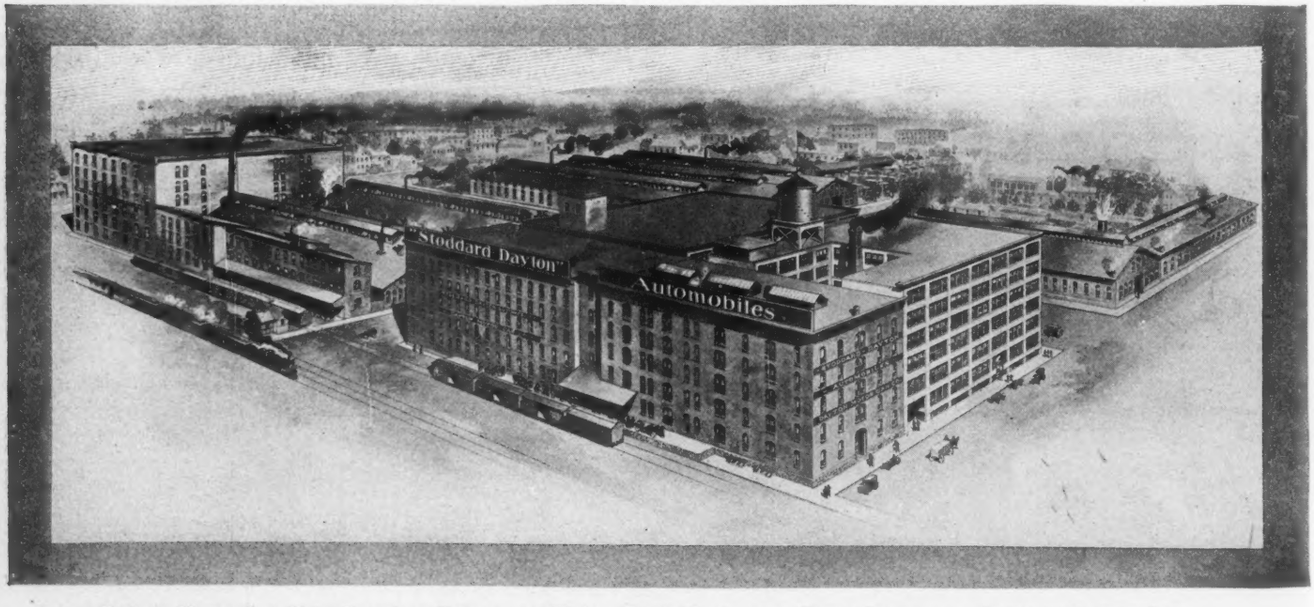
These pleasure cars alone will require at least two new tires during the coming season, making six tires per car. The tires to shoe them in this manner, if piled up, would make a solid chimney 119 miles high, and if placed on the ground flat they would make an unbroken bracelet over 1,000 miles long, and the inner tubes would reach in a ribbon of approximately 2,800 miles.

The city of Detroit, Mich., will alone produce 99,246 gasoline pleasure cars for 1910, and these will return a value of $115,136,000 from the public. Detroit's cars alone will furnish some interesting figures, such as: If they were placed end to end they would reach from New York to Boston, or a distance of 207 miles. If paid for in dollar bills and these were placed end to end they would reach over half way around the world. Detroit's output of these cars will equal that of the next three largest cities in numbers produced.

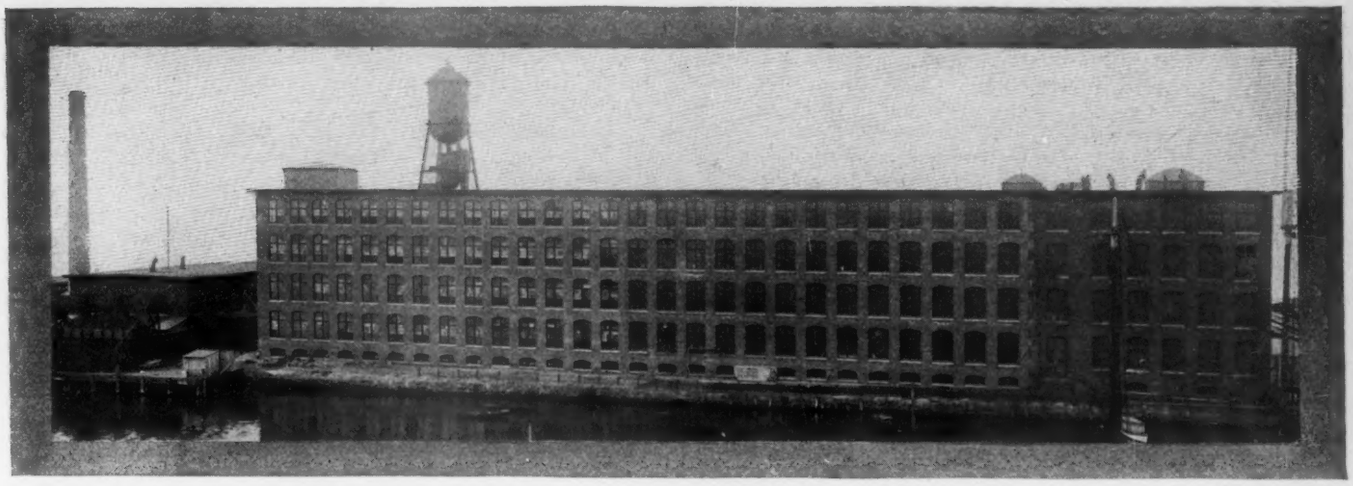
It is interesting to note that Buffalo, N. Y., while holding eighth place in point of numbers of cars, stands fifth in valuation, and in this manner a rough idea of where the lower-priced cars are made can be obtained.

An examination of the following table is interesting, for here are the statistics from one high-priced car and one very low-priced car:

	Low-priced car	High-priced car
Number of cars built in 1905	.....	12
Number of cars built in 1906	.....	125
Number of cars built in 1907	.....	200
Number of cars built in 1908	600	300
Number of cars built in 1909	2,300	400
Number of cars to be built in 1910	10,000	600
Square feet of floor space 1909	250,000	118,000
Square feet increase for 1909	175,000	55,000
Square feet increase for 1910	?	86,500
Approximate land value, 1909	$80,000	$15,000
Area of factory site in acres	48	15
Value of factory buildings	$160,000	$126,000
Value of factory equipment	$350,000	$340,000
Number of help in factory	?	530



DAYTON MOTOR CAR CO.'S PLANT AT DAYTON, IN WHICH TAKES PLACE THE EVOLUTION OF ALL STODDARD-DAYTON CARS



LOCOMOBILE WORKS AT BRIDGEPORT, CONN., OWNED BY THE LOCOMOBILE CO. OF AMERICA

Average price of the 1909 car	$485	$5,200
Value of 1908 output....	$250,000	$1,600,000
Value of 1909 output....	$1,000,000	$2,080,000
Value of 1910 output....	$4,000,000	$3,250,000

We here see a steady, healthy growth in the demand for the high-priced car, while the demand for the low-priced car is advancing by leaps and bounds.

In the western states, where Saturday afternoon used to line the main street of every small town with farmers' horses and wagons, we now see hundreds of low-priced cars at the curb, the farmer leaving his horses at home and making the run to town in his motor car with his family. Our eastern citizens have no conception of the vast number of motor cars which are sold in the west, and especially in the prairie states.

Among the Electrics

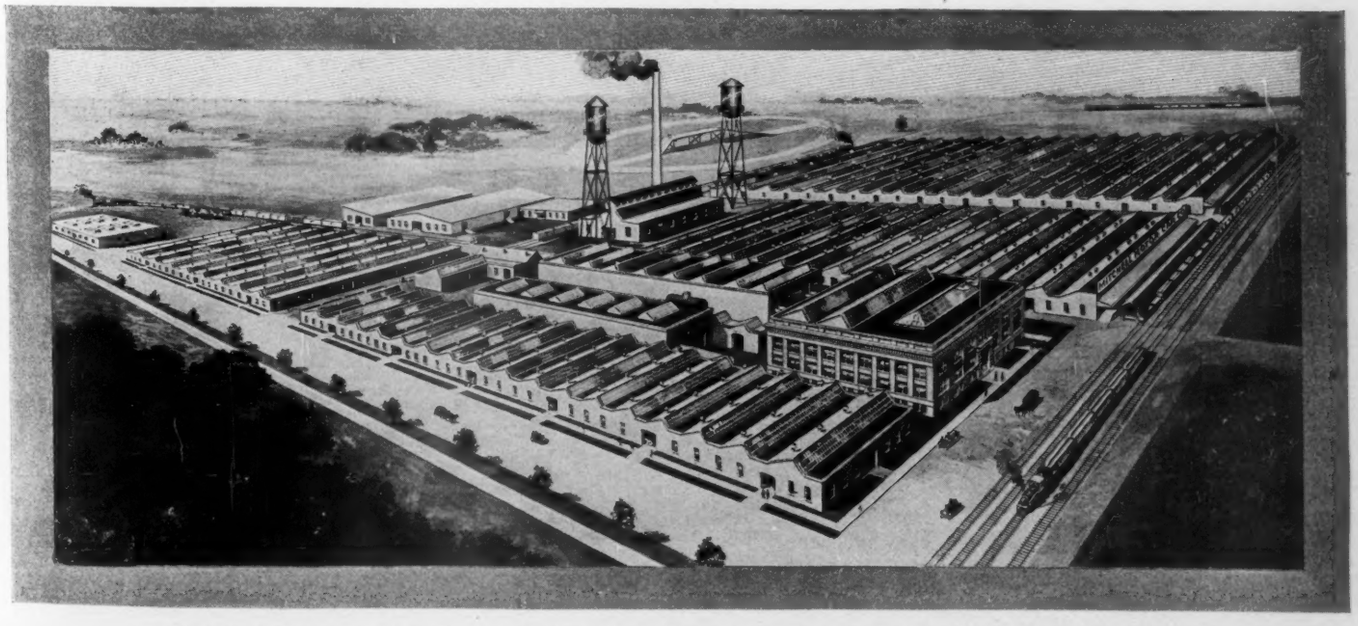
Among the electric pleasure cars we find eighteen different makes of this type of car. There seems to have been little manufacturing before 1905, but this branch of the industry shows a strong increase in the demand proportionate to the gasoline cars. Out of eighteen manufacturers, only three replied to inquiries, and of these but one was filled in as desired. This one make produced seventy-five cars during 1909 and expects to manufacture 200 for 1910. The company will have a floor space of 75,000 square feet, enclosing $25,000 in equipment and a working force of 105 men. The value of its 1909 output is $180,000, and for 1910 it will reach $500,000, so that a good idea may be had of the rapid growth of this branch of the industry.

One of the electric car makers will produce 2,500 cars during 1910, so that a rough estimate of the eighteen manufacturers' output may be placed at 10,000 cars, which will probably have an average price of $2,400 each. This will bring the output up to the large figure of $24,000,000. Of the steam pleasure cars there are six makers, who will no doubt produce close to 5,000 cars, valued at $7,400,000.

The motor buggies form a large group by themselves, composed of forty-one different makes, several of whom will approach the 2,000 mark in numbers of cars produced for 1910. Four concerns show an estimated output for 1910 of 4,950 cars, with a valuation of $4,480,000. One may therefore safely place the entire output of buggies for 1910 at approximately —150 cars each for the remaining thirty-seven factories—10,500 cars, valued at $8,400,000.

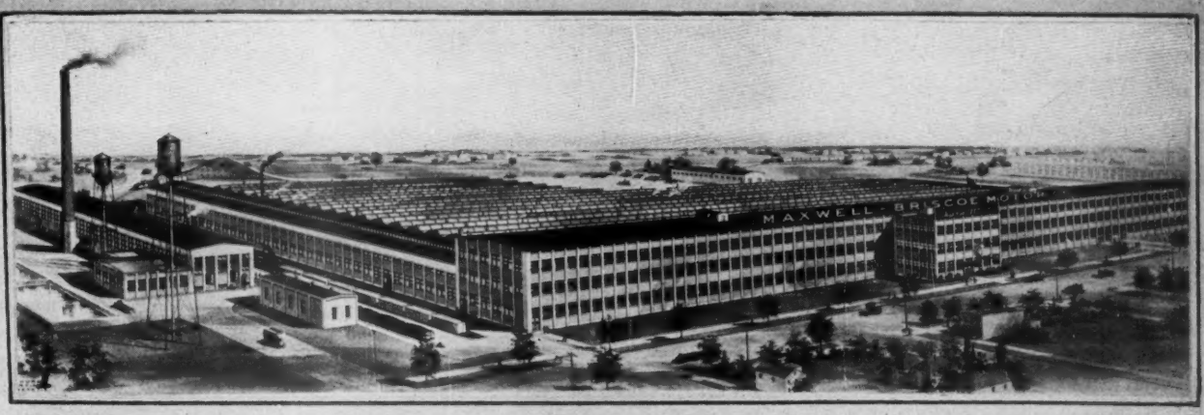
Status of Commercial Vehicles

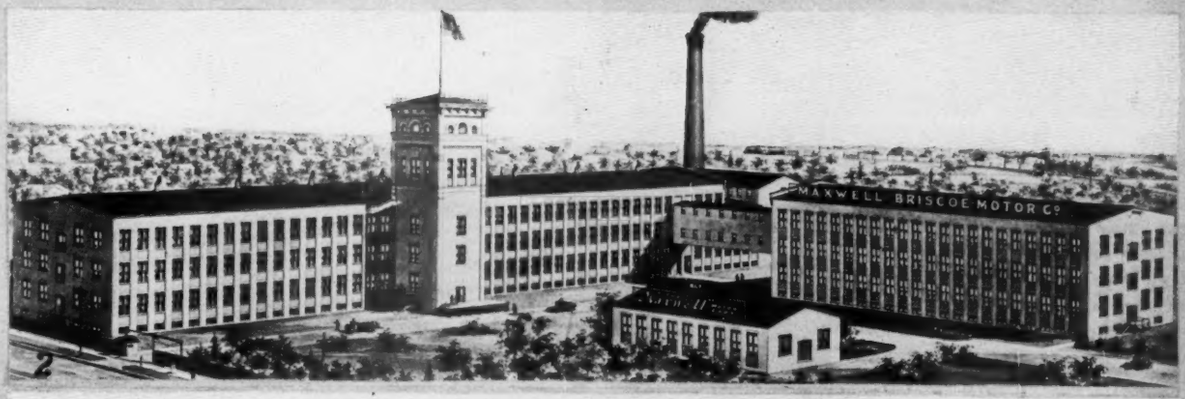
Now comes the consideration of the commercial vehicle, and this is a department which will show a growth of tremendous magnitude. There are at present seventy-one different makes of wagons, trucks and other commercial vehicles. Four of these show an expected output for 1910 of 2,075 cars, some of which are of course very large and expensive in the heavy-truck class. They will average $2,800 each, making a valuation of these four makes of $5,820,000. Conservative figures, considering the increasing demand for commercial vehicles of all kinds, can but place the total production in this class at close to 7,000 cars, valued at $19,600,000, for the 1910 output.

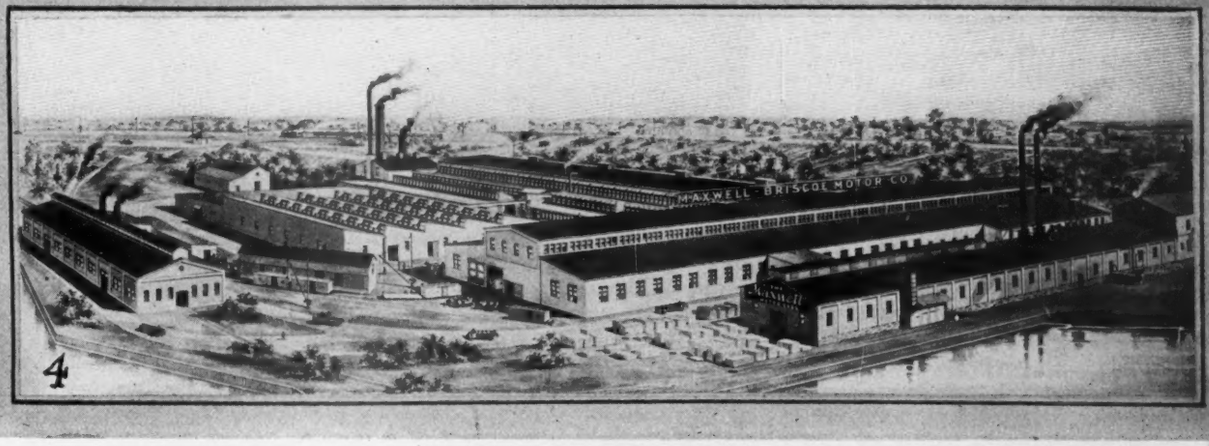


MITCHELL MOTOR CAR CO.'S PLANT AT RACINE, WIS., WHERE MITCHELL CAR IS BROUGHT TO LIFE

1—Inter-State Factory, Muncie, Ind. 2—Home of Chalmers-Detroit. 3—Cadillac Foundry, Pattern and Sheet Metal Departments. 4—Cadillac Engine and Motor Car Factories







1—Maxwell-Briscoe Plant at New Castle, Ind. 2—Where Maxwells are Made at Providence, R. I. 3 and 4— Two Maxwell-Briscoe Factories in Tarrytown, N. Y.

H. H. Franklin Mfg. Co., at Syracuse, N. Y., Where Is Evolved the Franklin Idea

In the business part of every city today we may see many heavy trucks moving about the streets loaded with merchandise which it would require ten to twelve horses to pull. On account of this cheapness of haulage, better speed, less room taken up when delivering and loading goods, and continued service, there can be little doubt that a very few years will see the horse banished from our city streets.

One of the five factories mentioned shows an increase in production of 200 to 900 from 1909 to 1910, and another shows from 150 to 600, an increase of four and one-half times and four times, respectively. The certainty of a much greater increase in this particular branch for 1911 is assured.

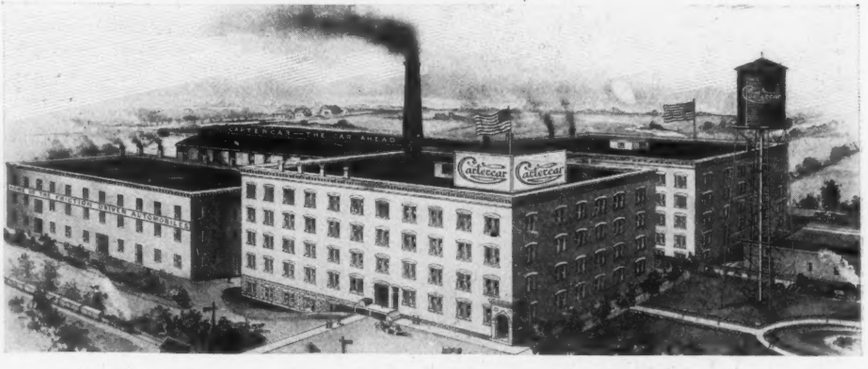
Only one of the replies was not marked confidential, and so Motor Age is especially pleased to give it in detail, and desires to call attention to the healthy growth of the business of this concern:

Cars built during 1908	2
Cars built during 1909	35
Cars to be built in 1910	375
Square feet floor space 1909	48,000
Additions during 1909, square feet	22,000
Additions for 1910, square feet	150,000
Factory site in acres	1
Value of the buildings	$70,000
Value of the factory equipment	$18,000
People employed	174
Average wages—week	$16.75
Average price of 1909 car	$2,250
Total valuation 1908 output	$5,000
Total valuation 1909 output	$78,750
Total valuation 1910 output	$785,000

Passing of the Seasons

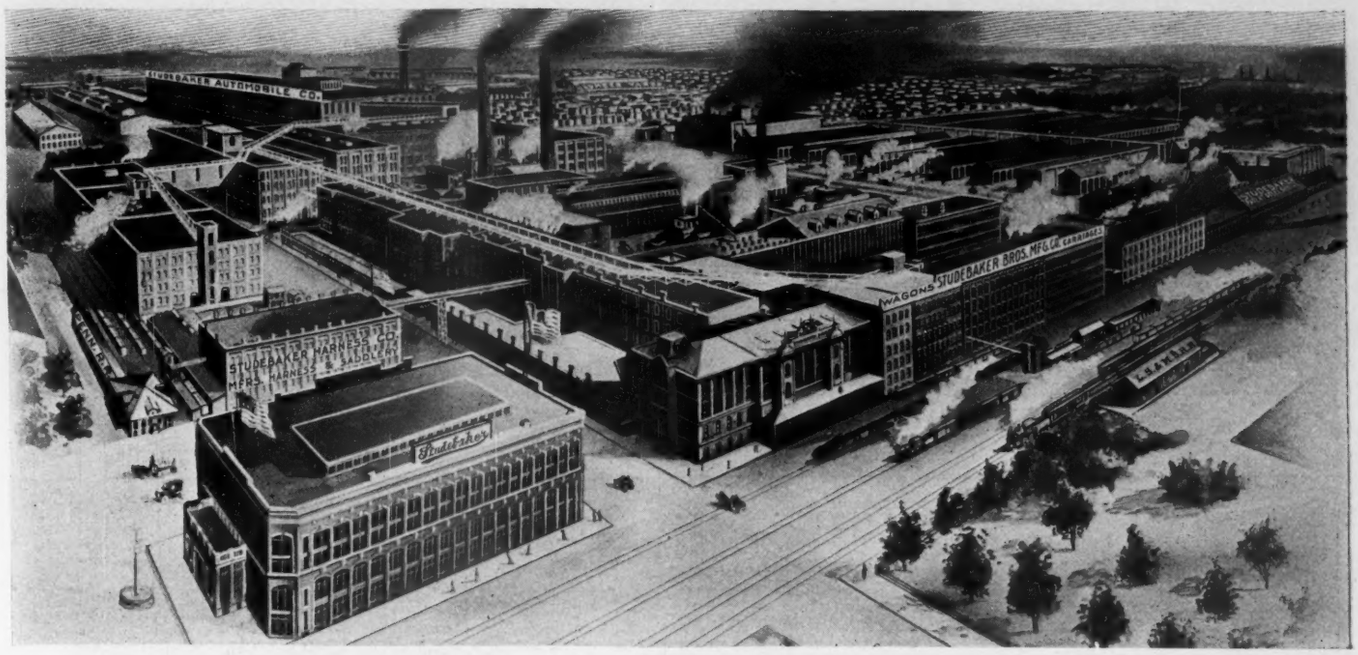
One can only properly gauge the progress of the industry by the exact number of cars turned out from year to year and note the increase in number as the seasons pass, it being remembered that each succeeding season sees the cars improved and made more dependable and reliable vehicles of transportation. Five or 6 years ago, when a few concerns started increasing, their story was about as follows: "We built twenty-five cars in 1904; in 1905 we made

Moline Plant at East Moline, Ill., the Home of "The Car for Anywhere"



Cartercar Factory at Pontiac, Mich., Where Is Made "The Car Ahead"

seventy-one cars; in 1906 we turned out 110; in 1907 we made 250; in 1908 we built 600 cars; in 1909 we turned out 1,000 cars; and for 1910 we will make 2,000 machines." The story of this concern is that of a steady, healthy growth, and if it is contrasted with some of the concerns that have sprung up within the last 3 years it shows how these later entrants into the industry have met with unprecedented prosperity by taking cognizance of the accomplishments of the older firms. One builder of low-priced cars started with 600 cars in 1908, jumped to 2,300 in 1909, and for next year has parts for 10,000 on hand. An example of still more rapid entry into the manufacturing field is that of a concern which is marketing 5,000 cars



STUDEBAKER FACTORIES AT SOUTH BEND, IND., COVER A LARGE AREA OF GROUND

PLANT OF THE BARTHOLOMEW CO., PEORIA, ILL., WHICH PRODUCES THE GLIDE

THE METZGER MOTOR CAR CO., FROM WHENCE COMES THE EVERITT CARS

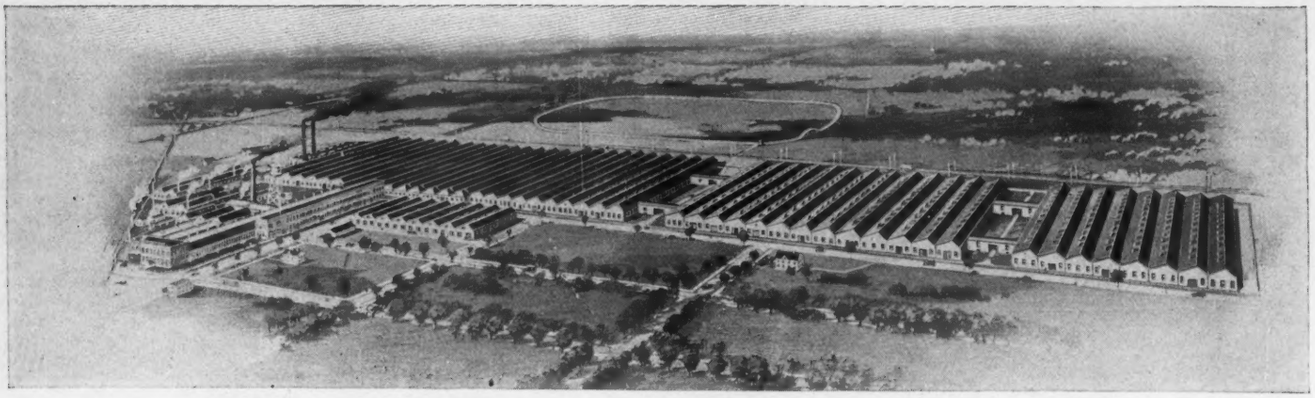
for this year and only entered the field during the early summer of 1909. One Michigan concern of cars selling under the $1,000-mark built 500 last year and is working on 7,500 for this season.

It may prove of interest to some readers to know exactly the status of a factory that has a certain manufacturing output per year. Let us take a concern that will turn out 2,600 cars selling in the neighborhood of $3,000. The factory site will approximate from 45 to 50 acres, according to the nature of the buildings; this factory will have 400,000 square feet of floor space for manufacturing and carrying on its various factory operations; the value of the factory buildings is placed at $400,000; the equipment of machinery in this factory costs $500,000; upwards of 1,200 help is needed for the factory and the various factory works; another 100 will be needed in the offices; and the weekly pay roll will be close to $16,000. The estimated value of the 1910 car output of such a factory is close to $6,000,000.

In contrast with the business transacted in a factory turning out 2,500 cars is that in one in which the output is placed at 6,000 cars. If this car should average in price $1,200, a force of 1,600 workmen would be needed to complete the output in the year. This would mean a weekly pay roll of $26,000. The value of such a modern factory building as is needed for such an output is $600,000, with another $500,000 for equipment such as the vast amount of machinery needed in it to carry on the manufacturing work. With a factory of this nature there is generally 40 acres of land, which, if land is close to valuable city property, may aggregate in value $275,000.

Other Calculations

It will also prove of interest to pass a few minutes in reflection on what a plant must be that is capable of turning out 10,000 cars in a season, even if all of them sell below the $1,000-mark. There is one factory in the country which in 1910 will build more than 11,000 cars, and its factory is located on 25 acres of land valued at $60,000. To build this number of cars but 1,700 men are employed and the pay roll runs to $20,000 weekly. The value of a factory for this output is $275,000, and in this is equipment estimated at $500,000. In contrast with this is a factory turning out high-priced cars which will build 1,400 for this year and has a factory force of 1,300 for this, making the weekly pay roll $22,000. This plant has scarcely 5 acres of factory site, this property being valued at $100,000 and the stock and buildings



FACTORIES OF THOMAS B. JEFFERY & CO., KENOSHA, WIS., WHERE THE RAMBLER CARS ARE MADE

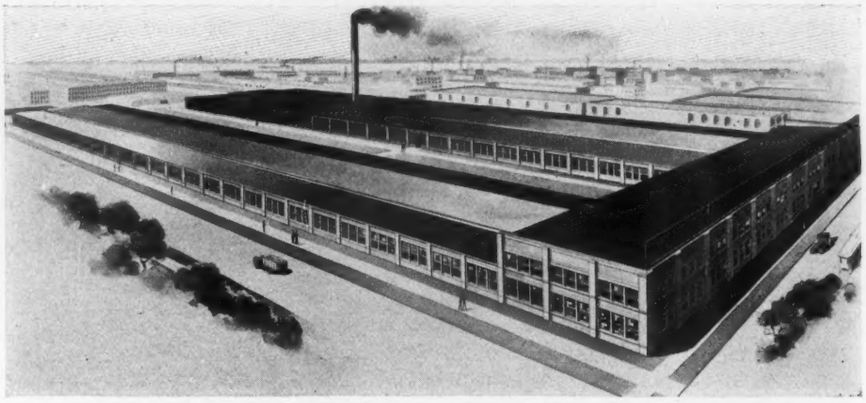
E-M-F FACTORY AT DETROIT, MICH., WHERE FIRST THROBS THE MOTOR OF THE E-M-F CARS

being estimated at over $1,000,000.

If the reader wishes to grasp some general relationships between car output and the size of factory to build such in and the number of men needed he must look deeper into the factory system. The amount of help needed to turn out 1,000 cars that sell at $1,000 each depends on the nature of the machinery in the factory and whether or not the majority of the car parts are built in that factory. If a factory is only used for assembling it is possible with not more than 300 men to turn out 3,000 cars in a season, because in all probability the motors are ready to be dropped into the chassis when they reach the factory, and the transmissions and rear axles may be in a similar state of completeness, so that the force of the factory is needed only to correctly place these several parts together and give them the necessary finishing and testing.

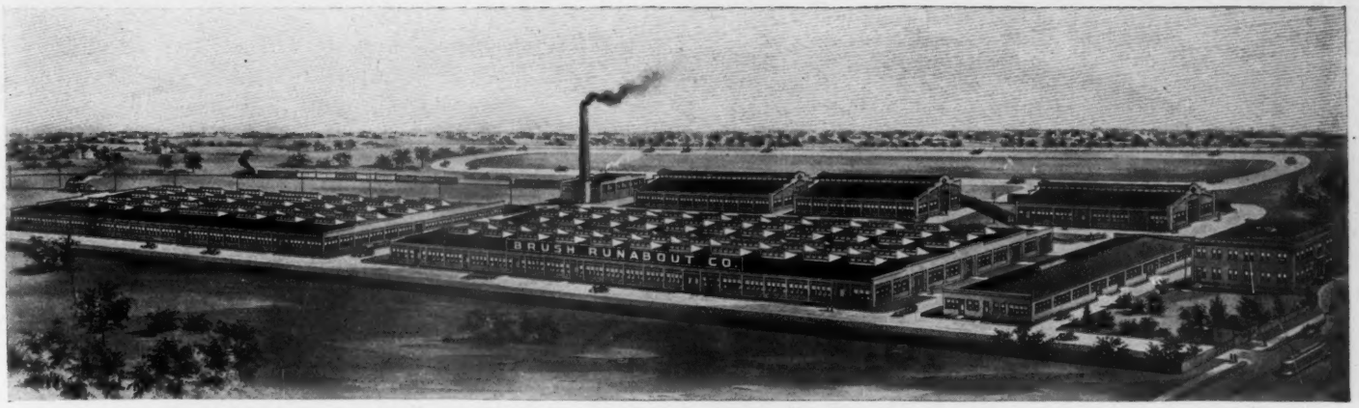
The amount of money paid per week to laborers in the factory varies greatly according to the location of the plant. In large cities where labor factions control, a high scale of wages is generally exacted. Throughout New England the average factory help will make $14 per week, and in contrast with this are some factories located in rather secluded towns where the help averages $8 per week.

Viewed from the tire vantage point



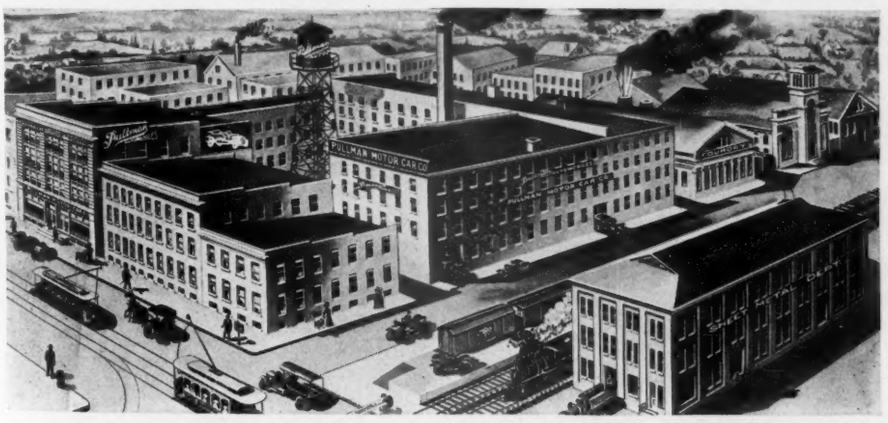
HUPP MOTOR CAR FACTORY, DETROIT, WHERE THRIVES THE LITTLE HUPMOBILE

BUSINESS-LIKE PLANT OF STEVENS-DURYEA CO. AT CHICOPEE FALLS, MASS.



BRUSH RUNABOUT PLANT SITUATED IN DETROIT, WHICH TURNS OUT INTO THE WORLD THE LITTLE BRUSH CARS

THE POPE-HARTFORD PLANT IS LOCATED AT HARTFORD, CONN., IN A REGION CELEBRATED FOR THE SKILLFUL HANDLING OF METALS

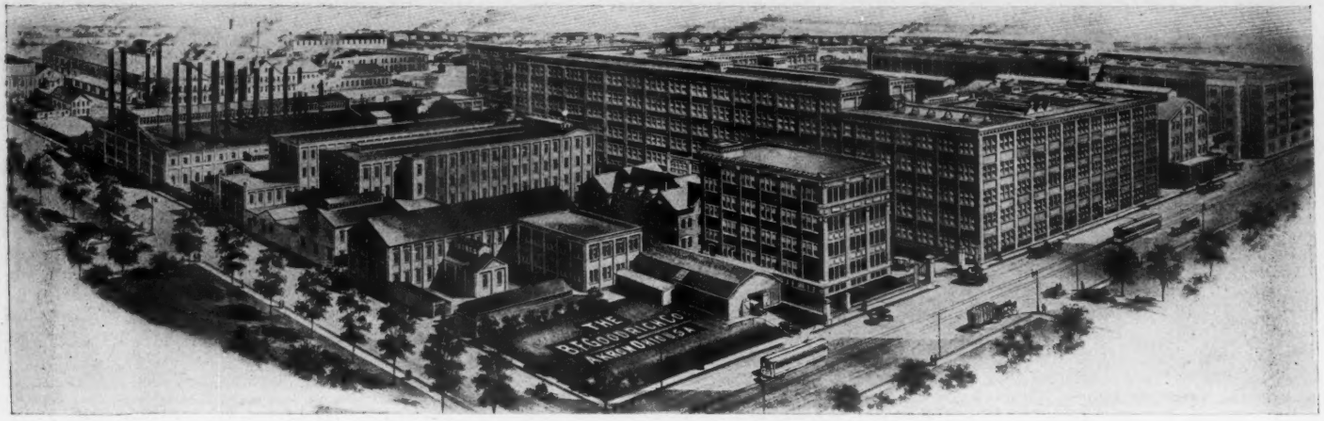


HOME OF PULLMAN PRODUCT, PULLMAN MOTOR CAR CO., YORK, PA.

PLANT AT TOLEDO, WHERE THE OVERLAND IS MADE

alone, the magnitude of the industry is phenomenal, and it is only by a few comparisons with other industries that a clear conception of the matter can be obtained. We have tire concerns such as the B. F. Goodrich Co. with 30 acres of floor space in the factory alone and 25 acres of factory site. In such a concern as this 5,000 help are employed the year round. The growth of this department of the industry is no less stupendous than that of the car end, the concern mentioned having increased nearly 50 per cent in 1909 over 1908 and having in view a contemplated increase of 50 per cent this year over the past season.

What is true of one tire concern is true of many others, the G & J company having made a 25 per cent increase in 1909 over 1908, and already has begun on a 50 per cent increase in 1910 over 1909. Not a few other tire concerns throughout the country have factory sites ranging from 14 to 22 acres, with floor area running from 150,000 square feet to 400,000 square feet. With all of them the business during 1909 was from 50 to 80 per cent in excess of the previous year, and this story is being duplicated in 1910. There is scarcely a tire factory but shows immense increases in floor space, many of them having been adding to their space every month in the year. There are not a few



IMMENSE TIRE-MAKING PLANT OF THE B. F. GOODRICH CO. AT AKRON, O.

tire concerns where the pay roll per week runs from $12,000 to $20,000, the workmen in not a few of them averaging from $12 to $17 per week.

All of the tire information on hand is confidential, and Motor Age therefore has given below an average of the conditions surrounding three of the principal manufacturers of this necessary part of a motor car:

Square feet of floor surface	424,446
Value of the buildings	$383,333
Value of the equipment	$300,000
Value of the land involved	$100,000
Average weekly number employes	2,360
Average weekly pay roll	$10,034
Factory increase for 1909, square feet	168,680
Factory increase for 1910, square feet	353,760
Value of output for 1908	$1,733,300
Value of output for 1909	$3,033,000
Value of output for 1910	$5,333,000

At an average price of $52 for each tire with its tube, this will call for 102,570 tires and tubes for each of these factories. There are seventeen important tire manufacturers who will be required to produce the tires for all of the pleasure and commercial vehicles of 1910 as well as those of previous years which are still running. Motor Age thus far has the following:

GASOLINE PLEASURE CARS

Cars produced and still running previous to 1909	50,000
Cars produced during 1909	100,000
Cars to be produced during 1910	313,373

ELECTRIC PLEASURE CARS

Electrics produced previous to 1909 and still running in 1910	1,000
Electrics to be produced during 1910	10,000

MOTOR BUGGIES

Buggies produced in 1909 and still running	2,000
Buggies to be built in 1910	10,500

COMMERCIAL MACHINES

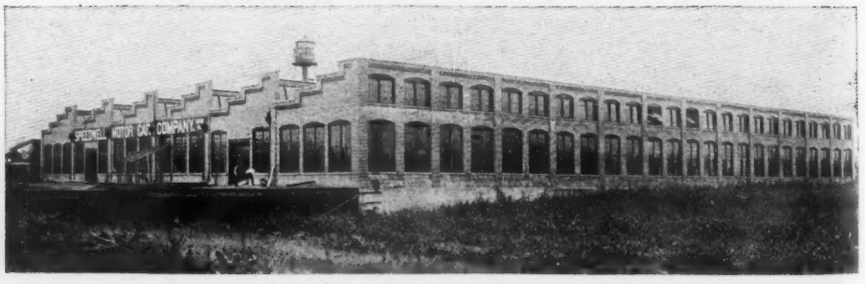
Gasoline cars produced in and previous to 1909	.....
Electric cars produced in and previous to 1909	1,000
Steam cars to be built in 1910	7,000
Cars in use at the end of 1910	594,873

Many Tires Required

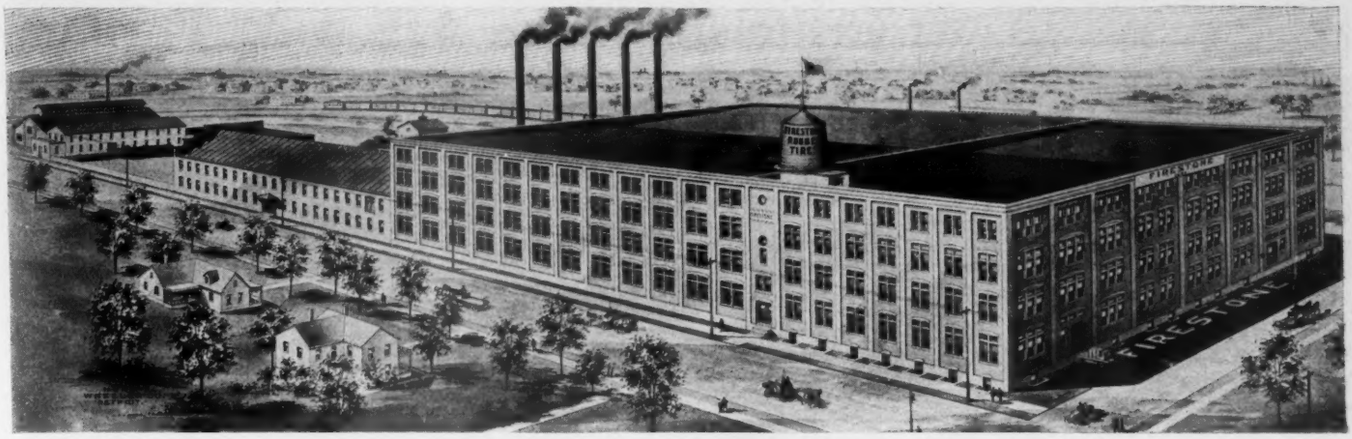
If these cars were placed end to end, touching each other, they would make an unbroken line reaching for 1,240 miles. It will require 2,974,365 tires and tubes to shoe this army of cars at five tires each for the year. These tires at an average price of $52 for the casing and tube will cause to flow into the coffers of the tire concerns the sum of $146,050,000. The tires would make a solid chimney over 188 miles high, or they would make a bracelet 1,550 miles long, or they would encircle an arm 493 miles in diameter. One might go still further in the speculative field and figure out how many miles would be made

PLANT OF THE BUICK MOTOR CO. AT FLINT, MICH. WHERE BUICK CARS

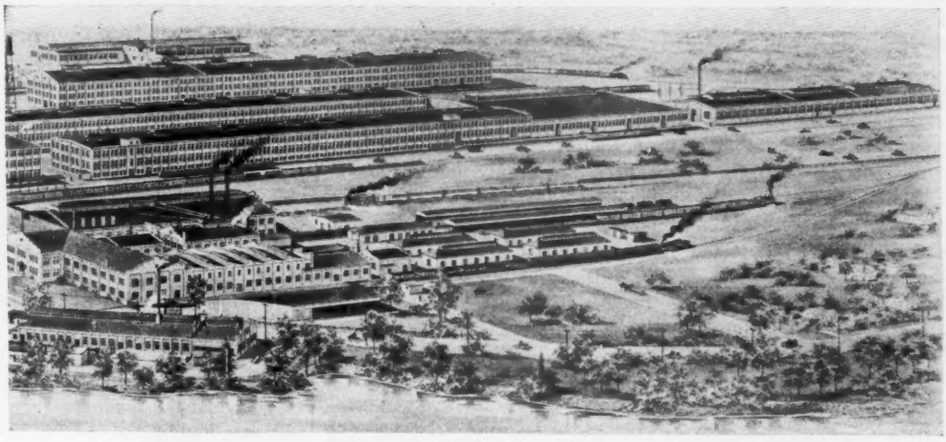
PLANT OF HARTFORD RUBBER WORKS CO. OF HARTFORD, CONN.



SPEEDWELL MOTOR CAR CO. FACTORY AT DAYTON, O.



AKRON FACTORY OF THE FIRESTONE CO., MANUFACTURING FIRESTONE TIRES



ARE MADE IN THOUSAND LOTS—VIEW GIVES IDEA OF SIZE OF PLANT

on these tires if every one of them came up to the guarantee of its maker. Also one might guess at the number of punctures and also the blowouts, and how much time it would take to repair them. There is no stopping along this line of thought.

Without considering the vast number of different products which go to make up the equipment of the motor cars, such as horns, speedometers, glass fronts, shock absorbers, trunk racks, gas light tanks, and the endless variety of things which are manufactured to tempt the owner of a car, Motor Age sums up the situation of the industry for 1910 about as follows:

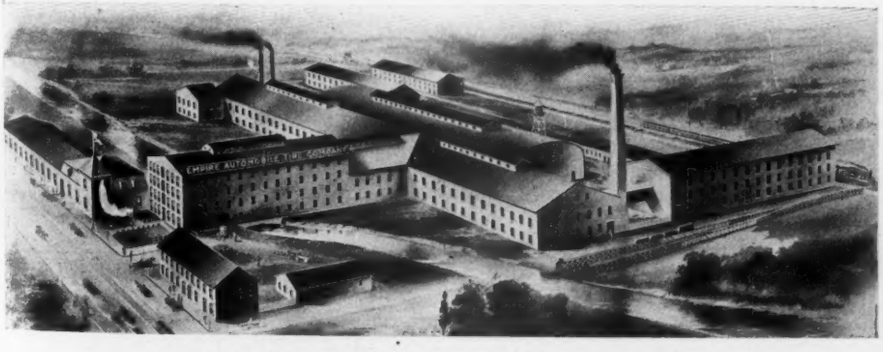
	Number	Value
Gasoline pleasure cars	313,373	$494,888,000
Electric pleasure cars	10,000	24,000,000
Steam pleasure cars	5,000	7,400,000
Motor buggies	10,500	8,400,000
Commercial vehicles	7,000	19,600,000
Total of new cars	445,873	$554,288,000

This is $6.60 per capita in the United States invested in motor cars.

Revolving around this car production one finds a multitude of factories turning out the various parts of cars about as follows, numbers indicating the number of manufacturers:

Cars	290
Axles	48
Balls	11
Brake lining	21
Batteries	51
Storage batteries	95
Ball bearings	26
Roller bearings	10
Bodies	164
Bumpers	22
Carbureters	79
Castings, aluminum and brass	149
Drive chains	11
Tire chains	22
Clutches	30
Spark coils	46
Commutators	5
Crankshafts	28
Dash boards	7
Fans	9
Metal floats	9
Drop forgings	71
Frames	8
Gears, blank	21
Gears, transmission	60
Mud guards	38
Tire holders	45
Motor hoods	29
Gas lamps	35
Oil lamps	28
Mechanical oilers	16
Magnetos	61
Motors, gasoline	79
Mufflers	27
Dust pans	18
Pedals	9
Spark plugs	124
Radiators	23
Springs	38
Sprockets	16
Tops	133
Valves	31
Wood wheels	22

Thus the list might go on for several pages, and from this one may gather an impression of the immensity of the industry which is destined to be one of the greatest in the United States.



FACTORIES WHERE THE EMPIRE TIRES ARE MADE

PARTS-MAKING PLANT OF WESTON-MOTT CO., FLINT, MICH.

Criticism of the A. L. A. M. Formula

A TENDENCY is rapidly developing in this country to describe motors, in relation to sizes, by giving the number of cubic inches displaced by the pistons rather than by giving the bore and stroke of the motor and leaving it to the layman to calculate which of any number of motors is the largest—a feat sometimes very confusing except to the expert mathematician. Motor Age has felt for some time that some simple means should be devised whereby the ordinary person may calculate the piston displacement of his motor without entering into higher mathematics at all, and the writer finally has evolved the following simple formula for this work: Note—All dimensions should be in inches.

1-cyl. motors: $\frac{D^2 \times \text{Stroke}}{1.2732} = \text{piston displacement}$

2-cyl. motors: $\frac{D^2 \times \text{Stroke}}{.6366} = \text{piston displacement}$

$\frac{.6376}{}$

3-cyl. motors: $\frac{D^2 \times \text{Stroke}}{.4244} = \text{piston displacement}$

4-cyl. motors: $\frac{D^2 \times \text{Stroke}}{.3183} = \text{piston displacement}$

5-cyl. motors: $\frac{D^2 \times \text{Stroke}}{.2546} = \text{piston displacement}$

6-cyl. motors: $\frac{D^2 \times \text{Stroke}}{.2122} = \text{piston displacement}$

The standard formula for finding the piston displacement being, thus: Dia.^{2} × .7854 × stroke × number of cylinder = piston displacement. It is thus readily seen that the factors ".7854" and the "number of cylinders" have been eliminated and in that way the equation has been simplified. For example: What is the piston displacement of a 5 by 5-inch four-cylinder motor?

Solution: The formula gives us

$$\frac{D^2 \times \text{stroke}}{.3183} = \frac{5^2 \times 5}{.3183} = \frac{25 \times 5}{.3183} = \frac{125}{.3183} =$$

392.7 cu. in.

```
.3183)125.0000(392.7 cu. in.
      95 49
      -----
      29 510
      28 647
      ------
       8630
       6366
       ----
      22640
      22281
      -----
        359
```

The entire calculation is thus seen to be one of simple division and may be done with very little trouble.

What is the piston displacement of a 5 by 5-inch six-cylinder motor? Solution:

```
.2122)125.0000(589.066, or 589.1 cu. in.
      106 10
      ------
       18 900
       16 976
       ------
        1 9240
        1 9098
        ------
          14200
          12732
          -----
           1468
```

In the same manner, the formula for calculating the horsepower of a motor according to the A. L. A. M. rating may be simplified as follows:

1-cylinder motors $\frac{D^2}{2.5} = \text{horsepower}$

2-cylinder motors $\frac{D^2}{1.25} = \text{horsepower}$

3-cylinder motors $\frac{D^2}{.833} = \text{horsepower}$

4-cylinder motors $\frac{D^2}{.625} = \text{horsepower}$

5-cylinder motors $\frac{D^2}{.5} = \text{horsepower}$

6-cylinder motors $\frac{D^2}{.417} = \text{horsepower}$

The worst of the A. L. A. M. horsepower rating is that it gives the horsepower of motors as the same quantity regardless of the length of the stroke, and therefore is open to just criticism. The A. L. A. M. rating is based upon 1,000 feet of piston speed per minute, and not upon 1,000 revolutions as is generally supposed.

There can be no doubt but that a 5 by 5½-inch motor gives more power than a 5 by 5-inch, and it is the opinion of many that with the modern design of motors the 5½ will turn over just about as fast as the 5-inch. Even should it not turn over with equal rapidity, it is not just to figure them the same horsepower, especially for ordinary work to which the motor is subjected for 99 per cent of the time of its service.

In many instances it has been shown that a motor will give 36 brake horsepower when the A. L. A. M. rating allows it but 28 horsepower. Something therefore is radically wrong with the A. L. A. M. formula, and with the general tendency towards using piston displacement for classification, there must be a formula evolved wherein a certain number of cubic inches shall equal 1 horsepower.

In an analysis of this subject, the engineer is greatly handicapped through lack of data on tests for actual horsepower of motors on the block. The matter therefore will have to be analyzed from a theoretical standpoint, and this has been done so that the results seem to be much more accurate than the A. L. A. M. rating. Let us deal with four-cylinder motors exclusively in order to simplify our reasoning. According to the A. L. A. M. rating, a 4 by 4 and a 4 by 4½ are given as 25.6 horsepower.

	4-in.	4½-in.	Diff.
Horsepower according to A. L. A. M. rating	25.6	25.6	0
Piston displacement	201.1	226.2	25.1
Revolutions at 1,000 feet per minute	1500	1333	167
Feet per minute at 1,000 revolutions	667	750	83

At 1,000 revolutions, the 4-inch stroke motor covers 667 feet with its piston per minute, whereas the 4½-inch stroke motor covers 750 feet, or an excess of 11.2 per cent. According to the basis of the A. L. A. M. rating of horsepower, this should mean an increase of 11.2 per cent—equal to 2.87 horsepower—thus making the 4 by 4½-inch motor 28.47 horsepower at 1,000 revolutions

New French Idea in Shock Absorbers

THE French accessory mart has just received the addition of a shock absorber known as the J. M., having a certain resemblance, in principle at any rate, to the supplementary spiral springs used in America. It consists of an elastic connection between the end of the spring and the spring-hanger. On the French article, however, the spring is contained within a bronze cylindrical housing, to which a hanger is cast integral. Within the cylinder is a sort of piston, the base of which receives the lower end of the coil spring, while the upper end of the spring pushes against the closed end of the cylinder. A couple of nuts at the end of the connecting rod passing down the center of the cylinder hold the disk-forming piston in position, and at the same time serve to regulate the tension of the spring. The shackles are attached to the upper end of the connecting rod. Instead of a pull on rigidly-attached shackles, the springs have an elastic connection in the coil spring.

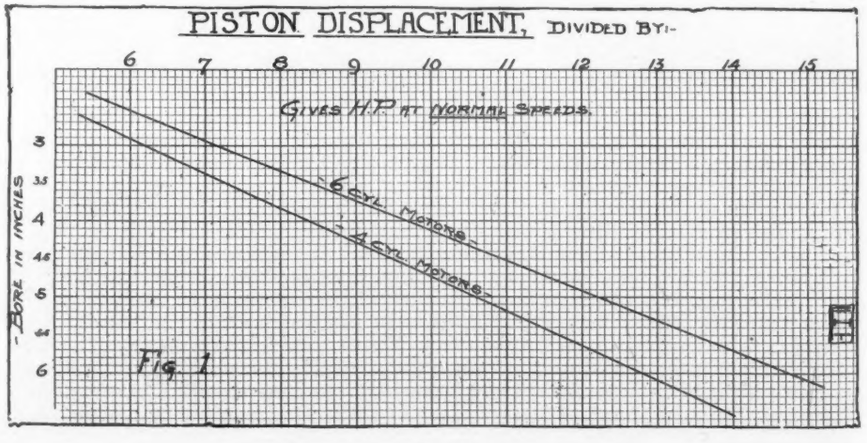


FIG. 1

Finding Motor Piston Displacement

per minute. It is certainly safe to assume that the 4 by 4½-inch motor will turn up 1,000 revolutions per minute, hence, the 4 by 4 motor will show 7.86 cubic inches of piston displacement for each horsepower and the 4 by 4½ motor will show 7.94 cubic inches of piston displacement for each horsepower. Taking the average of these two, or 7.9 inches per horsepower, we have the following table of horsepowers:

		A.L.A.M.
4 by 4	= 25.5 horsepower	25.6
4 by 4½	= 28.6 horsepower	25.6
4 by 5	= 31.8 horsepower	25.6
5 by 5	= 49.8 horsepower	40.0
5 by 5½	= 54.7 horsepower	40.0
5 by 6	= 59.6 horsepower	40.0

It seems absolutely necessary to take into consideration the number of revolutions per minute as well as the length of the stroke. Robert's English formula for horsepower delivered to the rear wheels is given as $\frac{D^2 \times S \times N \times Rev.}{18,000} = H.P.$ Modifying this formula to allow for 20 per cent loss through friction between the motor and the rear wheels, we have $\frac{D^2 \times S \times N \times Rev.}{15,000} = H.P.$ of motor. Simplifying this, we have, for any four-cylinder motor, $\frac{D^2 \times S \times R}{3,500} = H.P.$

At 1,000 revolutions per minute for a 5 by 6 motor, therefore, we have $\frac{5^2 \times 6,000}{3,500} = 42.9$ horsepower.

Some French tests of motors on the block, with an electrical testing apparatus, gave the following:

3x4 motor at 1,500 r. p. m. = 18.5 horsepower
4x5 motor at 1,200 r. p. m. = 30 horsepower
5x6 motor at 1,100 r. p. m. = 45 horsepower

From the above it appears that probably the best solution of the problem is to use a certain number of cubic inches piston displacement for each horsepower; using a different number for different bore of cylinder, thus:

3- inch	6.15 cubic inches
3½-inch	7.4 cubic inches
4- inch	8.5 cubic inches
4½-inch	9.3 cubic inches
5- inch	10.5 cubic inches
5½-inch	11.6 cubic inches
6- inch	12.6 cubic inches

The sizes between these bores is readily found by means of the chart, which is explained later. This will approximately agree with the English formula for the speeds following:

3- inch	1,800 revolutions per minute
3½-inch	1,450 revolutions per minute
4- inch	1,200 revolutions per minute
4½-inch	1,175 revolutions per minute
5- inch	1,050 revolutions per minute
5½-inch	950 revolutions per minute
6- inch	870 revolutions per minute

This may be reasonably considered the normal speeds of these motors.

Using this as a basis, we may use the following chart 2 which indicates the factor by which to divide the total piston displacement of the motor to get the normal horsepower, at normal speeds.

If we go beyond the normal speeds of motors, there is no means at hand of calculating within reasonable limits how much horsepower the machine will develop, for all depends upon design, compression, lubrication, size of valves, balance, etc., and where one motor might show 50 horsepower at 3,000 revolutions per minute another motor of the same size might use up all of its power to overcome the inertia and friction of its moving parts and therefore deliver no power at all.

At best, the elements are so numerous and complicated that any solution can but be unsatisfactory and unreliable, and our method given herein can never go beyond the approximate. However, they will no doubt help the owner to compare his car with others and also analyze the statements of the agents of cars he may be thinking of buying, when the question of horsepower is entered into.

A motor will put out an increase of power with an increase of speed up to certain limits determined by design, etc., when the friction and inertia will be felt to more and more extent until the output is nil. Therefore I have prepared another chart compiled from the few statistics at hand and this may be used as a rough guide from which to decide upon gear ratio to be used, the object being to get the best out of the motor for the general use to which it is put. By looking for speeds at the left, then following the lines to the right until the bore line is intersected, we find the factor at the top in the same manner as in the first chart, except that on this one the bore is given roughly and is on the curves instead of at the left.

Chart 2 is given, not as authority, but more in the way of a suggestion as to what might be worked up into an accurate method within reasonable limits. No statistics are available by which to compile such a chart and it has been made with the idea of striking a probable average as to what will happen at different speeds. There is certainly food for thought in chart 1, and when deciding upon gear ratio it might be well to carefully study it.

The difference in the lines showing the factors for four and six-cylinder cars on chart 2 is calculated from the increased cooling surface to which the gases are exposed during the power stroke in the six-cylinder over the four-cylinder of the same piston displacement, and assuming that the increase in the friction will be in the same ratio.

Segregation of Pacific Coast Dealers

THE first division of the licensed and unlicensed dealers took place in Los Angeles when the Automobile Dealers' Association of Southern California was disbanded and in its place the Licensed Motor Car Association of Los Angeles was organized. This new organization includes twenty-eight of the leading firms and has been incorporated under the laws of the state of California. The idea of the association is to hold annual contests and shows in which only licensed motor cars can appear. The organizers felt that such an association was for the best interests of their business and took the step only after much consideration. The idea originated with Norman W. Church, who controls seventeen of the western states for the Stoddard-Dayton. Mr. Church considered the matter for over a month before submitting it to the directors of the old association. The idea was enthusiastically received and immediate steps taken toward the organization which was perfected at a recent meeting held in the city of Los Angeles.

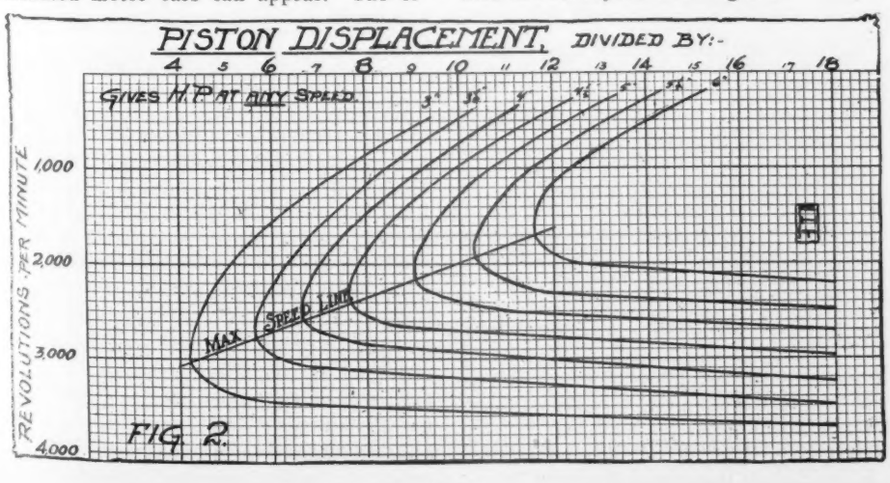


FIG. 2

Manufacturers' Communications

SIXES ON THE CONTINENT

BUFFALO, N. Y.—Editor Motor Age—Through a careful collection of the specifications of motor cars made in a number of European countries, copies of which have been received in this country, it has become possible to obtain a good idea not only of the trend of the market across the Atlantic, but also of the main structural tendencies shown there. From a list of the specifications compiled in England, this company has drawn some interesting deductions and averages, and these have just been sent to all our dealers for their information and benefit. Nine countries—England, France, Germany, Belgium, Scotland, Switzerland, Italy, Austria and Ireland—are represented in the list of cars whose specifications were available, and a practically full representation was obtained from every country except Italy, although all the leading makes from that country were included. In all, 118 makes and 522 models are included in the resume, the principal countries being England with sixty-two makes and 251 models, France with thirty makes and 177 models, and Germany with four makes and nineteen models. Of the 522 models, 353 are of the four-cylinder type, eighty-three are six-cylinder models, sixty-four are two-cylinders, twenty-one single-cylinders, and one only of that type of which great things were promised a scant 5 years ago, the three-cylinder.

This list of the number of cylinders used in the various models, taken from the makers' specifications, shows in an irrefutable manner that instead of going backward the six-cylinder movement in Europe is steadily advancing. In fact it may be said that an even greater advance is being made than on this side of the Atlantic. This is shown by the fact that European makers are not confining their six-cylinder work to high-powered models, a number of them showing chassis whose horsepowers range from 22 to 26. Only one six-cylinder car of what may be regarded as high horsepower is listed—an English car that is a 90-horsepower duplicate of a racing machine manufactured at one time by the company listing it. The average horsepower for the eighty-three models is 40.1, according to the Royal Automobile Club rating, or 39.4 by the rating adopted by the Association of Licensed Automobile Manufacturers. The average of the four-cylinder cars is 24.5 horsepower by the Royal Automobile Club formula and 23.6 according to the A. L. A. M. Interesting to a great degree is the fact that, notwithstanding the reports of the great number of small cars to be manufactured in Europe, the number of models of one and two-cylinder cars added together total only two more than the number of sixes which are manufactured.

One of the most pertinent features of information brought out by an examination of the list of models is that the manufacture of six-cylinder cars has now settled down to a firm and well-established basis and the output is confined to a great extent to the better known and larger manufacturers. The price of six-cylinder cars in Europe and America does not differ to any great extent. The custom of selling the chassis only, or, at least, quoting the chassis price and bodies separately, exists to a much greater extent there than here. Thirty-four six-cylinder chassis of representative price and make average $3,691, as compared with $2,290 as the average for 122 models of four-cylinders, a difference of $1,401. Another tendency of the times, according to the figures compiled at the Pierce-Arrow factory, is shown by the difference in the stroke and bore. For the six-cylinder motor the bore is 18.1 per cent less than the stroke, while the average for four-cylinder motors is 2.5 per cent higher.

Altogether, the statistics gathered show that the six in Europe has steadily gained instead of lost ground; that it is regarded as a thoroughly established product; that it is invading the field of small horsepower, and that, as seen by the number of standing of manufacturers producing sixes, they have beaten back all prejudices that might at one time have existed against them.—Pierce-Arrow Motor Car Co.

ADVANTAGES OF COMPETITION

Indianapolis, Ind.—Editor Motor Age—So long as road and track racing was confined to motor cars designed for racing purposes only there was no general interest in the events except from the standpoint of sport, pure and simple. A performance, good or bad, of a specially-built racing car conveyed no information to the prospective buyer of a motor car as to the quality of any particular make of stock car. Furthermore, the manufacturer of the specially-built racing car was not particularly benefited by his racing experience, so far as his standard stock models were concerned. The advent of the stock chassis race, however, has revolutionized public sentiment relative to road and track races, and has been of incalculable benefit to the manufacturers in the development of standard stock models, and, incidentally, of great value to the buying public. For a time the road touring contest was looked upon as being the best means of developing a stock car and bringing to the attention of the manufacturers its weak and good points, but it has remained for the road and track race to develop the highest efficiency in a stock car.

In touring contests it is the rule to put the car in charge of an experienced driver, and the car is driven with the utmost care and subjected only to such tests as may be incident to the condition of the roads or the requirements of the rules. The driver in a touring car contest does not voluntarily subject his car to the severest duty. The car is nursed and given the benefit of the doubt, and if penalties are inflicted the driver of the car has an excuse to offer the designer, usually laying the blame upon the rules committee or the condition of the road.

It is not so with road and track racing. In these events the car is subjected to its limit of endurance, and barring accidents no excuses for failure are permissible either to or by the designer. It is up to the engineering department to design a car that will stand the heavy duty, and there is no motive upon the driver's part to spare the car, unless he has a yellow streak in his makeup.

In view of these facts it is natural that there should be no boy's play about road and track racing. It is very serious business and calls for the limit of intelligence and the utmost endurance upon the part of both driver and car. This is particularly true as regards long races. It is hard to realize what enormous strains a car is subjected to in going hundreds of miles at a mile-a-minute clip. The vibrations and stresses are so great that the slightest weaknesses in material, design or workmanship are brought out. All of this information and experience redounds to the advantage of both manufacturer and buyer if the car is a stock model. Thousands of miles of ordinary driving may

Coming Motor Events

JANUARY

7—Closing of Grand Central palace show, New York.
8-15—Madison Square garden show, New York.
17-22—Show of Kansas City Motor Car Trade Association.
17-24—Philadelphia show.
24-29—Show at Portland, Ore.
24-31—Show at Washington, D. C.
24-29—Ninth annual Detroit show.

FEBRUARY.

4-6—Mardi Gras track meet, New Orleans.
5-12—N. A. A. M. show, Chicago Coliseum.
14-19—Show at Hartford, Conn.
14-21—Show at St. Louis, Mo.
14-18—Annual show at Buffalo.
19-26—Show at Newark, N. J.
19-26—Inter-mountain show, Salt Lake City, Utah.
21-26—Show at Binghamton, N. Y.
21-26—Annual Cincinnati show.
22-27—Milwaukee show.
28-March 5—Kansas City Automobile Dealers' Association's show.

MARCH

5-12—Boston show.
21-28—Denver Motor Club show.

fail to develop a weak point which would be clearly shown by a few hundred miles of racing speed. Months might be consumed in developing a car by ordinary driving, while the same information can be obtained in days, or even hours, in road and track racing events.

Properly conducted road and track races will do more than all other means combined to fully develop and perfect the modern motor car, and at the same time it will be done in the shortest possible space of time.—C. C. Hanch, Nordyke & Marmon Co.

HERRESHOFF OUTPUT

Detroit, Mich.—Editor Motor Age—With a full knowledge of Motor Age's reputation for fair dealing and its desire to print nothing but what is correct, we beg to call attention to a paragraph printed on page 9 of the issue of December 23, relative to our company. The facts are, the Herreshoff Motor Co. built in 1909 200 cars. Operations were then stopped because of a disagreement arising between it and its national selling agent. We are now making delivery of our 1910 model and present conditions augur well for a big success this season.—Herreshoff Motor Co.

HANDLES STANDARD SIX

Kansas City, Mo.—Editor Motor Age—In a recent issue of Motor Age we notice an announcement that the Lake Motor Car Co. now handles the Standard Six. This is an error, as the St. Louis Car Co.'s Standard Six is to be handled by the Standard Automobile Co., 3324-26 Main street, with H. F. Lang, president; R. W. Coleman, vice-president; A. D. Lang, secretary, and J. H. Lang, treasurer.—Standard Automobile Co.

FREE INSPECTION SERVICE

Buffalo, N. Y.—Editor Motor Age—An important feature of the service department which the E. R. Thomas Motor Co. has recently inaugurated is the free inspection service which this company gives to every Thomas owner. Mr. Thomas says that he feels that his responsibility does not end with the sale of the car. Every effort must be made to help the owner get the utmost pleasure and utmost service from his car. No matter how well built a car may be, or how well it is cared for, adjustment and repairs are sure to be necessary occasionally, and so, to protect the owner, to insure the use of his car whenever he wants it, the E. R. Thomas Motor Co. has placed a large corps of expert mechanicians upon the road whose duty it is to call upon each owner at regular intervals, inspect his car carefully, make such adjustments as he may deem necessary, and give advice as to the running and maintenance of his car—and all of this free of charge to him. This is a personal service which Mr. Thomas has introduced as a guarantee that Thomas owners shall be well taken care of. It means that the upkeep cost of Thomas cars is materially diminished and the most intimate relations between the factory and owners established and maintained.—E. R. Thomas Motor Co.

REGARDING GOODYEAR RUMOR

Akron, O.—Editor Motor Age—Directly after making the announcement that we were successful in securing a contract of considerable magnitude from the Buick Motor Co., of Flint, Mich., one of our competitors began circulating a rumor to the effect that this company had been absorbed by other interests. This is positively untrue. The control of the Goodyear Tire and Rubber Co. remains exactly where it has been since its organization, and the reputed purchasers have not secured an interest, either in whole or in part, in this company. The Cadillac Motor Car Co. has equipped its cars with Goodyear tires for the last 3 years; likewise the Oakland Motor Car Co., of Pontiac, Mich.; and their success with the Goodyear detachable tire and rim attracted the attention of the Buick Motor Co., with the result that we secured from it the largest tire contract ever given a rubber tire manufacturer in the history of the industry. This is the basis for the rumors being circulated.

Most rubber manufacturers sell their product by pointing out the merits of their tires in connection with manufacturing advantages. There are some, however—but, happily, limited in number—who seem to think that the first duty in getting business is to pay their respects to competitors by trumping up reasons for not patronizing them. The Goodyear Tire and Rubber Co. has been growing too fast to suit these people, and their guns are consequently trained upon us. We ask our friends to accept this competitive talk at its usual value, and any time they want facts to communicate directly with us.—Goodyear Tire and Rubber Co.

LEHMAN FILES A SUIT

New York—Editor Motor Age—Pursuing the policy of protecting my rights on my patent, covering a capped spark plug, I beg to advise that on November 26, 1909, an application for an injunction was filed in the United States circuit court, southern district of New York, against C. F. Splitdorf, of this city, for an infringement of patent No. 741684, filed February 6, 1902, and granted October 20, 1903. This suit is similar to the one being brought against the A. R. Mosler Co., application for an injunction having been filed September 13, 1909, and answer to which filed by the latter firm December 6, 1909.—J. H. Lehman.

Some Recent Motor Car Literature

"Leading American Cars," the official handbook of the American Motor Car Manufacturers' Association, giving detailed specifications of all 1910 models made by members of the A. M. C. M. A., has just been issued and is being distributed among the trade. The book contains interesting data regarding the A. M. C. M. A., names and addresses of members, committee of management, committees and other information. Models have been arranged according to price classification. Many interesting facts are disclosed within the eighty-five pages. Members of the A. M. C. M. A. are offering to the public pleasure cars from $475 to $6,500 and commercial vehicles ranging in price from $500 to $6,000. The specifications show that there are twenty-seven different models selling under $1,000, thirty-three models from $1,000 to $1,499, twelve from $2,000 to $2,499, twenty-nine from $2,500 to $2,999, twenty-four from $3,000 to $3,999, and twenty-nine models selling for $4,000 and above. In the commercial division there are eighty-six distinct models embracing all manner of vehicles such as light delivery, light and heavy trucks, ambulances, patrol wagons, sight-seeing coaches, etc.

The Midland company has a catalog illustrating its model G-9 touring car. The motor, transmission, rear axle and brakes are the subjects of illustrations. This company, also, has a specification sheet on its model L car.

The catalog of the Detroit electric for next season is decorated by a color border surrounding each page. Full page illustrations of the different models are given, as well as detailed specifications. A series of photographic reproductions of the factory, showing its various departments, constitute the last portion of the catalog.

Catalog No. 11, of the Cartercar Co., is printed in two colors, the illustrations and type in one, and a tinted border for each page in straw color. Full page groups of the different models are given. Three interesting illustrations are those showing sections of bearings for carrying the cross shaft.

The December calendar from the Otto Konigslow Mfg. Co. has for its illustration the clutch rocker shaft ready to attach to the chassis.

Wheeler & Schebler have a six-page folder on their model L carbureter. A sectional illustration shows the complete construction.

Frank P. Illsley, Powers building, Chicago, has a thirty-one-page book which is a dissertation on motor cars, designs, constructions, and the various matters which enter into their makeup. The book contains many suggestions of merit.

The Seagrave Co. has a small book entitled, "Motor Propelled Fire Apparatus," by J. H. Carlyle, chief of the fire department, Vancouver, British Columbia, Canada. It is in the form of a report showing the exact work of this apparatus in that city.

The Readers' Clearing House

EDITOR'S NOTE—In this department Motor Age answers free of charge questions regarding motor problems, and invites the discussion of pertinent subjects. Correspondence is solicited from subscribers and others. All communications must be properly signed, and should the writer not wish his name to appear, he may use any nom de plume desired.

GROUNDING A BATTERY

PURVIS, Miss.—Editor Motor Age—Recently I saw a four-cylinder coil that had one wire grounded on the engine. I think it was a Dow coil and it had the units connected on top with two bars running across the top. Should it be grounded on the engine or should the batteries be grounded in another place?—John W. Woodward.

In the coil of which you speak the ground wire connected from the bar which connects the units together to the cylinder or ground is for the purpose of completing the secondary circuit. It is sometimes the practice of running one wire from the battery to the switch, from the battery to the ground terminal on the coil, and thence to ground. The battery, however, could be grounded at some other place.

FUTURE OF AIR-COOLERS

Onawa, Ia.—Editor Motor Age—Will Motor Age express its opinion on the future of air-cooled motor cars? Will they be used extensively in a few years?—O. A. Kindig.

There is no reason why there should not be a future for air-cooled motor cars, and the chances are they would have been much more popular than at present had it not been for the ignorance of the purchasers and operators. The modern air-cooled cars are giving as good satisfaction and as little trouble as water-cooled cars. This probably is due to an improvement in the air-cooling devices.

QUESTIONS FROM TEXAS

San Antonio, Tex.—Editor Motor Age—Through the Readers' Clearing House will Motor Age answer the following questions: 1—What kind of a clutch has the Jackson car? Where is the camshaft located and how does it get its power? 2—Is it customary to write bore or stroke first? 3—What are the cylinder dimensions of Strang's Fiat and what kind of a magneto did he use at Atlanta? Is it true that he used two exhaust valves on each cylinder? 4—What ratio has the Stoddard speedster bevel gear? 5—What is the minimum engine revolutions per minute and the maximum? 6—Where is the Ohio made and is it an assembled car? Has it done anything in the way of racing, hill-climbing or endurance tests? 7—How long will a motor car last with average handling? 8—Did Oldfield ever make a record in any of his other cars beside the Benz? 9—Is Grinnon a new man on the Buick team? 10—Will Motor Age publish special show issues this year as in the past? We have been greatly interested in the previous show issues, as they give not only information regarding the specifications of different cars, but can be used as a ready reference file.—Motor Age Subscribers.

The Jackson car uses a multiple-disk clutch running in oil, and the camshaft on the Jackson motor is located over the heads of the cylinders, being driven through bevel gears from a vertical shaft receiving power through bevel gears from the mainshaft. It always is customary to write the bore first and stroke afterwards. The Fiat driven by Strang at Atlanta was 7.48 inches bore by 6.29 inches stroke. A Bosch magneto is used by Strang on this car. It is true that there are two exhaust valves and one intake valve on each cylinder. The gear ratios of cars of any make will vary with the kind of work for which they are desired, and the country in which they are expected to be used, probably from 2½ to 1, to 3½ or 4 to 1. The minimum number of revolutions per minute for an engine is the lowest number at which that engine will run steadily. The maximum number is governed by the piston speed per minute, and will vary with the length of stroke. The Ohio car is made by the Ohio Motor Car Co., Cincinnati, Ohio. The motor car industry is still too young to be able to say how long a motor car will last with average handling. There are cars on the road today which were built 5 years ago and which show signs of lasting a good deal longer. The modern car, however, with proper lubrication and an occasional replacement of bearings should last from 10 to 15 years. Barney Oldfield has made records with the old No. 999 car and with the Peerless Green Dragon, National Old Glory and the Knox six. None of these records, however, is standing at present, the last one wiped out being a 50-mile record made in California in 1904 and beaten by Oldfield at Dallas, Texas, recently. This and the 15-mile records are, by the way, the only ones which Oldfield now holds. Grinnon has been mechanician for Burman in all the big racing meets this year and has driven in a few races himself. Motor Age will, in accordance with previous practice, publish show issues and will have all information regarding specifications of different cars that can be used as a ready reference file by its readers.

CARBURETER ADJUSTMENTS

Belmond, Ia.—Editor Motor Age—Through the Readers' Clearing House will Motor Age answer the following questions: 1—What causes a cylinder to miss when the engine is running at a moderate rate? When speeded up all four cylinders work. I have looked over the ignition system very carefully and a good spark is delivered to every cylinder. The spark plugs have been cleaned and one replaced. The carbureter has been adjusted to every position but without avail. 2—I want to install some electric lights. Would it be possible to put them in a regular gas headlight? Would it give a good light if attached to a four-cylinder, high-tension magneto? 3—Would I need different lens on the mirrors, and if so what kind? 4—I have had a great deal of trouble with the gas headlights this summer, the burners becoming plugged up and spoiling the lens. What is the composition used in recovering a mirror or lens? 5—Would it be possible for an amateur to do good work in recoating them, or would it be better to get a new set of lenses?—Harry J. Bohning.

In answer to your first query, it looks as though your carbureter is only adjustable for one speed; in other words, if you get it adjusted for slow speed you would not get the right mixture for a high speed, and vice versa. It is quite possible to put electric lights into your gas headlights, but it would not be feasible to light them from the magneto; you would have to use a battery for this purpose. The reflectors in your present headlight would not be satisfactory for the electric light because of the position the electric bulb would occupy. While it might be possible for the amateur to resilver the reflectors, the cheaper plan would be to get a new set or to send the old ones to some glass company and have them remirrored.

WANTS ENGINE TIRE PUMPS

Hannibal, Mo.—Editor Motor Age—Through the Readers' Clearing House will Motor Age express its opinion on the following scheme? I have a Maxwell four-cylinder motor in my car, rated at 24-30 horsepower. If I should place a three-way valve on the intake manifold on the motor, so that by turning same it would allow cylinder No. 1 to take pure air from the outside instead of from the carbureter,

thus using the cylinder as an air compressor to inflate tires, would it be possible to inflate a tire to, say 75 pounds pressure, if the cylinder shows 60 pounds compression?—H. A. S.

To do as you want with your Maxwell engine it will be necessary to not only have a three-way valve on your intake manifold, but you must also have one on your exhaust manifold, unless you should take the compression from the cylinder out through valves which you have placed in the head. This valve would necessarily have to be a check valve, and with this device there would be no reason why you should not get the pressure you want, the motor practically working as a pump. Motor Age would not recommend this scheme, and believes that you could accomplish better results by attaching any of the little power pumps now on the market to your flywheel for the purpose of pumping tires, etc.

HARDLY LIKELY

Cambridge, Ill.—Editor Motor Age—Recently in conversation with a gasoline tank agent I was informed that gasoline pumped through small piping would make the gasoline non-explosive and non-combustible. Is this true? If so, why?—H.

Motor Age knows of no reason why pumping liquid gasoline through a small tubing would make it any more non-explosive. You evidently have misinterpreted or misunderstood the information received.

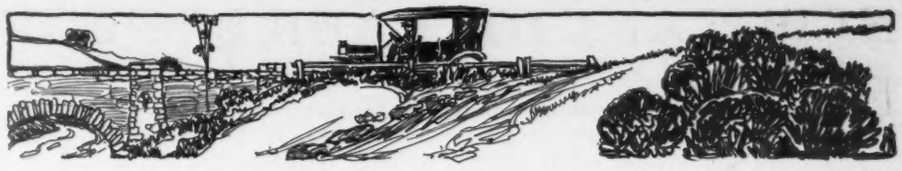
QUESTION OF POWER

Kankakee, Ill.—Editor Motor Age—Through the Readers Clearing House will Motor Age answer the following questions: 1—There are two cars, each weighing 2,700 pounds, both with 34 by 3½-inch tires, each geared to the same ratio; in fact, both are just alike. One car has a six-cylinder motor with 3½-inch bore and 4-inch stroke. The other car has a four-cylinder motor with a 4¼-inch bore and 4½-inch stroke. Which would be the more powerful and efficient on the road, on hills, or in deep sand? Which has the more horsepower? Will Motor Age kindly explain the meeting of "geared to the ratio of three to one?"—O. F. Gohlke.

By the A. L. A. M. formula the six-cylinder car will have a rating of 29.4 horsepower. The four-cylinder car will have a rating of 28.8 horsepower. The meaning of gear ratio is the ratio between the rotational speed of the engine and the rotational speed of the driving wheels, which in your query is three to one. On the high gear for each three revolutions of your flywheel your driving wheels will make one revolution.

CAMERON COOLING

Rockford, Ill.—Editor Motor Age—There recently appeared in the columns of the Readers' Clearing House an inquiry as to the cooling qualities of the Cameron air-cooled motor, made and used by the Cameron Car Co., of Beverly, Mass. I have driven a 1909 model this season and have



thoroughly tried out the cooling properties of the Cameron motor. It will go out on low gear with heavy loads and bad roads, and develop full power as long as any water-cooled motor; in fact, longer than some of them. One needs have no fear of overheating, and I am ready at any time to demonstrate the cooling features of the Cameron car.—Charles W. Yeager.

CARS FOR DOCTORS

Monroe, Ind.—Editor Motor Age—We doctors are thankful that some of the leading motor car manufacturers are commencing to see the wants of the medical profession and are busy building suitable cars. What we need is a small car that is light and has plenty of power to carry us over roads that are difficult for the ordinary car to travel. The runabout car is the car, but the great trouble with so many of us is that we have to look at expenses too much, as we are a class that take care of our own cars, and the larger cars are a luxury and not a constant want of the average doctor. Build us a plain car, one that will make the miles at the least cost possible, and the lighter the car, the lighter the tire expense, which is one of our troubles. The water-cooling trouble is not to be considered as one, for in the greater number of cars this is almost perfect. If the air-cooled machine is a success, that is one more good point for the busy man. Get busy and make us the every-day car, one that will wear and be as simple as possible, as this is the kind of car we want and is the kind of car which, when once perfected, will be purchased by a great many men that will not talk motor car at the present. Simplicity, honesty and durability should not be neglected as the greatest motto to the consumer.—A Doctor.

NORTHERN PARTS

Three Rivers, Mich.—Editor Motor Age—In Motor Age, issue December 23, F. Young asked where he could secure parts and extras for a Northern car. If he cannot secure such from the E-M-F company, I would advise him to communicate with Chapin Brothers, Detroit, Mich. I believe they handle all that is left of the Northern.—A. Shulander.

TIP FOR TOURISTS

Waco, Texas.—Editor Motor Age—To those contemplating touring in Texas it may be of interest to them to know that Waco has most excellent roads for motoring, and tourists will make no mistake in passing through Waco, which is on the main thoroughfare of the state. Waco has a motor club consisting of 100 members and the club's membership is rapidly growing. One of the attractions here is a ¾-mile track where we have held some fine races, and it is expected that next season many more will be held.—O. H. Sappington.

ANOTHER TIRE RECORD

South Egremont, Mass.—Editor Motor Age—I read in a recent issue of Motor Age an account of a Reo car making a record of 3,692 miles without any tire troubles, also a Detroit car with a mileage of 4,479 without a puncture or tire troubles, and I desire to state my experience. I have a 1909 seven-passenger Berkshire car, which is made in Pittsfield, Mass., and which is fitted with Diamond tires. I ran this car 5,500 miles before I had my first tire troubles, and that was on the rear tire, and now the car has a mileage of 8,526 miles and the front tires have had no tire troubles of any nature. I have not had the tires off the rims, and they look as if they were good for 500 miles additional. I believe my success is due to keeping the tires pumped up hard all the time.—George A. Peck.

DODGE'S PUNCTURES

Darrana, Kan.—Editor Motor Age—I have been using a model F Buick for the past 15 months, and in that time I have not had a bit of tire trouble or even a puncture; the tires have never been off the wheels, and have the same air in them as when the car was shipped. This car has been run through mud and snow and over all kinds of roads. The tires are Michelins and the distance covered about 3,500 miles.—Subscriber.

HOW TO TELL SECONDS

Cincinnati, O.—Editor Motor Age—In Motor Age, issue November 25, appeared a communication under the caption "Distinguishing Inferior Cases." The writer wishes to say there is a way to tell a second from a first casing. The majority of manufacturers buff their name entirely off of second cases, and they can be distinguished in this way.—A Tire Man.

THREE-THROW FOR A SIX

Detroit, Mich.—Editor Motor Age—Through the Readers' Clearing House will Motor Age tell me if a three-throw crankshaft can be used successfully, two cylinders connected to each bend? Should they be fired 3—5—1—4—2—6?—Subscriber.

It would not be feasible to build a six-cylinder motor with a three-throw crankshaft unless the cylinders were set obliquely, or V shape. Your engine would have to fire though, should it be built as you suggest, 3—5—1—4—6—2 instead of as you state.

NEW PLANT FOR CADILLAC COMPANY PLANNED

DETROIT, Mich, Jan. 3—The General Motors Co. has purchased from the Detroit United Railway a piece of property on Woodward avenue, with a frontage of over 300 feet and running back to Cass avenue, which, it is announced, will be used for the construction of a handsome new factory for the Cadillac Motor Co., the main plant of which is on Cass avenue, directly across that street from the property purchased. The land is at present occupied by the Woodward avenue barns and car yards. These will be removed to the northern part of the city, near the Ford Motor Co.'s new plant, during the summer, and construction will be started on the Cadillac addition as soon as the real estate is available.

The consideration in the deal is not announced, but the property is considered very valuable. The deal was not put through by any intermediary, President W. C. Durant, of General Motors, and President Jere C. Hutchins, of the D. U. R., making the arrangement privately.

The Cadillac has been more cramped for space than any of the other large Detroit factories, this being due to the fact that the plant has expanded to the limit over the property at its disposal. The present plant occupies virtually the entire block on which it is situated, the only exception being one lot on the southeast corner, which is occupied by the Detroit fire department. The new ground will practically permit the firm to double its floor space, provided the same system of construction in vogue in the present factory is employed.

Owen Buys a Plant

Another important deal of the past week was the purchase by the recently organized Owen Motor Car Co. of the entire plant of the J. P. Waddell Show Case and Cabinet Co., on North Boulevard, just west of the Packard plant. The Owen has been using the lower floor of this structure for some time in experimental work. The property is ideally situated for the purpose, and the Owen also secured with it enough real estate to permit of the erecting next spring of a fine new concrete front and addition. The company announces its 1910 output at 500 high-powered cars and is now installing a large amount of machinery. It is planned to employ in the neighborhood of 400 men in 1910, but this number will be doubled in the following year, as soon as the additional factory space is completed. Ralph R. Owen, Angus Smith, E. A. Turnbull and Fred W. Hodges are the men behind the Owen, which is incorporated at $500,000, half of which is paid in.

Windsor, Detroit's Canadian suburb, is feeling to a great extent the influence of the American city's prominence in the field of manufacturing. The Ford, E-M-F and Regal are all operating plants across the river, and these will be joined shortly by the plant of the Dominion Motors Co., Ltd., announcement of the organization of which has just been made public. The company is planning to manufacture 250 cars in 1910, deliveries to start June 1. Pending the equipment of the factory the headquarters of the firm are situated at 24 West Pitt street, in Windsor. Detroit and Windsor capital is announced as back of the venture. A. J. Kinnucan, formerly purchasing agent of the Brush Runabout Co., and Earl W. Winans, the designer of the Regal, are in charge of the development work.

Worried by A. L. A. M. Attitude

The attitude of the Association of Licensed Automobile Manufacturers toward the multitude of new factories has been occasioning great interest locally. Virtually all of the concerns organized during the last 6 months have applied for membership, but in vain. The fact that the Metzger Motor Co., at the head of which are men prominent in manufacturing since the early days of the industry, was compelled to purchase the Hewitt Motor Co. to secure a license has been commented on as possessing especial significance. The Hewitt concern will be brought to Detroit and its output added to the list of local factories. A new building, adjacent to the Metzger factory, will be erected shortly for its use. As yet it is doubtful if the example of the Metzger Co. will be followed by any of the other new factories, as there are, it is admitted, very few licenses for sale. There exists, however, considerable anxiety regarding the attitude of the association toward manufacturers who have been denied the privilege of paying royalties to the lessees of the Selden patent.

Among the new motor cars seen on the street during the last few days is the Abbott, designed by John G. Utz, formerly of the Chalmers-Detroit staff. The Abbott, which is backed by a firm with plenty of capital and will be manufactured in large quantities from a factory now under construction, bears a remarkable resemblance to the Chalmers, the most apparent difference being a condensation of the motor in a manner which permits 10 inches more room in the car, most of which has been allotted to the tonneau.

Announcement of new distributing agencies continue of almost daily occurrence. The National will be seen in the Detroit field in 1910, W. S. Summer, manager of the Racine Boat and Auto Co., 253 Jefferson avenue, having secured the agency for Detroit and Michigan. The Ohio shaft-drive electric will be handled locally by the Atwood Automobile Co. The Prest-O-Lite Co., of Indianapolis, has established a local branch at 872 Woodward avenue, with Cornelius Allison in charge. A Detroit branch has been opened at 876 Woodward avenue by Wheeler & Schebler, of Indianapolis, manufacturers of the Schebler carbureters. L. M. Railsback has been appointed manager.

That European manufacturers will have the battle of their lives to defend their territory against the invasion of American-made motor cars was the frank expression of opinion here by William M. Letts, of the London firm of Charles Jarrott & Letts, Ltd., who spent several days at the Detroit factories, leaving for New York to attend the national shows before returning to his home in England.

Mr. Letts, who is one of the largest retailers in Great Britain and is also extensively interested in several manufacturing concerns, was astounded at the growth of the manufacturing industry in Detroit, which he had not inspected for more than two years. "It is almost unbelievable," said he. "Your manufacturers have studied the art of quantity production in a way that is characteristically thorough and can turn out cars at a rate which would simply cause our makers to hold up their hands in horror. I don't really believe that they credit the stories of rapid production which they read about the American factories, but one only needs to take a short trip through some of the Detroit factories to appreciate that nothing but the sober truth has been told. I am coming back in September and I expect to deal extensively with one or more of the Detroit factories. They can do things which we can hardly expect from our makers for some time. I only wish that I had yielded to an impulse several years ago, when I seriously deliberated an essay into the field of manufacturing in Detroit.

"Your American makers have another great advantage over those in Europe. Both Great Britain and France are virtually free-trade nations. The United States has a protective policy. There is nothing to prevent the American manufacturer from invading our market, while it is virtually an impossibility for us to send our cars here, on account of the 35 per cent tariff wall which your government has thrown up and which, I understand, is insured for years to come."

While here Mr. Letts, under the guidance of President R. D. Chapin, of the Hudson Motor Car Co., inspected the factories of the Chalmers-Detroit, the Packard, the Hudson and several others. He was especially pleased with the Hudson car, which he pronounced a car built on foreign lines by American methods.

Freight Car Famine

The worst freight-car famine in the history of the manufacturing trade in Detroit has been in evidence during the past week. In fact, the situation has become so serious as to really threaten the continuous running of some of the motor car factories. All the local concerns are now running at full speed and the release by the United States courts of some 800

E-M-F cars, held up by injunction during the litigation with the Studebaker Automobile Co., made the condition doubly precarious. Virtually all the E-M-F cars had been sold and were naturally cumbering up valuable factory space.

Some amusing competition for cars developed. Each of the big factories organized a force of scouts, who patrolled the railroad tracks, looking for box cars with 7-foot doors. As soon as one was found the factory headquarters was immediately communicated with and the permission of the road controlling the car was requested. This secured, and without waiting for the arrival of the car at the factory, enough new cars to fill the vehicle were towed out from the factory to the location where the freight car had been found, a car with a loading apparatus accompanying. The boxcar would be loaded in short time and the activity of the organization would be focussed on securing another.

Western shipments have been leaving on time, as a rule, the eastern and southern consignments being the most delayed. This fact is accounted for by the activity of the local branch of the American Car and Foundry Co., which is making a large consignment of boxcars for the Northwestern railroad. These cars are being loaded by the Detroit factories as fast as they are finished.

But even with all this pains, the congestion at some of the factories has reached the critical stage. At the Cadillac there are now 150 cars which are stored in the factory overnight and in the streets about the factory during the day, permission to do this having been secured only when it was obvious that, without it, the factory would be compelled to shut down.

A ray of light is afforded the gloomy shipping situation by the arrival of the news that the transcontinental lines have relinquished their intention, announced several weeks ago, of raising the rate from $3 to $3 a hundred on completed motor cars. Whether the reconsideration is to be permanent or whether the increase in rates is to reappear shortly under a new guise, is a matter that is causing considerable speculation.

ALL-CONNECTICUT TEST

Hartford, Conn., Jan. 3—That the forthcoming all-Connecticut endurance run is to be a meet of no mean proportions is the intention of the committee in charge. At a meeting of the contest committee, a special committee consisting of C. H. Gillette, S. A. Miner and H. W. Nuckols was appointed to appear before the meeting of the manufacturers' committee to be held during the Madison Square Garden show January 7. The following technical committee was appointed to examine the cars: H. P. Maxim, Henry Souther and Charles D. Rice. A motor carnival and speed trials will probably be held in connection with the 3-day endurance run.

Sixteen Cars Survive In French Reliability

Paris, Dec. 25—Sixteen out of twenty-nine have survived with perfect scores in the first reliability trials held in France. The event was an endurance test of 2,000 miles, spread over 15 consecutive days, with conditions similar to those of the sealed bonnet tests of America, with the exception that the seals were replaced by an official observer. As the French observer is too often lacking in seriousness, and can be accused of such crimes as leaving his car to go shopping or sightseeing en route, it has been decided to replace him by seals on the bonnets when the time comes for holding the next competition.

The percentage of clean-score survivors is remarkable when it is considered that the event was run in mid-winter over roads which were bad under the French standard. It is true there was never much mud-plugging, but always a hard surface, so full of pot holes that it had a masterly power of shaking nuts loose and causing the rupture of sundry bolts. As an example of the progress that has been made, it is worth recalling that in a similar event 2 years ago, over a good road guarded by military, there was an elimination of 50 per cent after 6 days' running. This year about 35 per cent has disappeared after 15 days on the open road. Next year the average speed will be raised from 15½ miles an hour to 19; the daily runs will be made longer, and not even the opportunity will be given to clean fouled spark plugs.

Although officially known as voiturettes, it needs a stretch of the imagination to place some of the competitors in this class. Light racing cars would be a more correct definition. Cylinder dimensions were fixed at 4.9 by 5.9 maximum bore and stroke for a one-lunger; 3.9 by 5.1 for two-cylinders and 3.1 by 4.7 for four cylinders. A considerable amount of speed can be got out of four cylinders of over 3-inch bore and nearly 5-inch stroke, as was fully proved during the trials. Officially, however, the extra speed above 15½ miles went for nothing.

With one or two exceptions the competing vehicles were light sporting cars, many of them capable of doing 50 miles an hour on the open. Under the rules they had to be equipped for winter travel, complete with mud guards, hood, wind shield, lanterns, etc., and have comfortable touring bodies. One of the competitors went to the extent of furnishing a comfortable inside steering body, although the majority had the smallest wind shields and the lowest hoods possible, their drivers considering speed of far more importance than comfort.

Single-cylinders were not as numerous as might have been expected, there being but three of this type in the sixteen clean-score winners. There were no two-cylinder cars, but plenty of small fours. The distinctive feature of the motors was the proportion of long strokes. Among the singles the dimensions in one case were 120 by 140, and in all others 100 by 130 millimetres. In the four-cylinder class the greatest proportion of stroke to bore was 1.84, and the lowest 1.38, the average being about 1.50. In the majority of cases the fours had their cylinders in one casting without a central bearing. High-tension ignition was used invariably, without any storage batteries as a stand-by. Cone clutches dominated, and final drive in all cases was by cardan shaft.

In every case failures were due to careless driving or minor defects. Georges Sizaire, the one-cylinder expert and speed champion, was put out of business by the breakage of a ball in a front wheel bearing. One of the four-cylinder Rolland-Pilain vehicles—the most racy-looking and speediest of the whole lot—had to pull up sharp when going at 40 miles an hour. The result was a quick skid and an equally quick smashing of a rear wheel. Phil De Marne played at racing with his four-cylinder Gregoire until a back spring failed him when taking a gully at high speed. He changed the leaf alone in half an hour, but henceforth was counted among the out-and-outers. A Sizaire-Naudin went out through a valve sticking in its guide. A Hurtu broke its gasoline pipe; a Barre jumped its fan belt, and another car from the same factory damaged its radiator in a collision; a Doriot-Flandrin had a leaky radiator; a Corre-La-Licorne bought bad gasoline on the road and lost so much time getting rid of it that it was not worth starting again.

Those that came through after making all controls on time, without changing a part, and without adjustments, represented eleven firms. Alcyon was the only one to put in three cars and bring all three through with perfect scores. Delage and Demeester started with only one each and finished perfect; all the others lost one or two cars during the fortnight. The perfect scorers are:

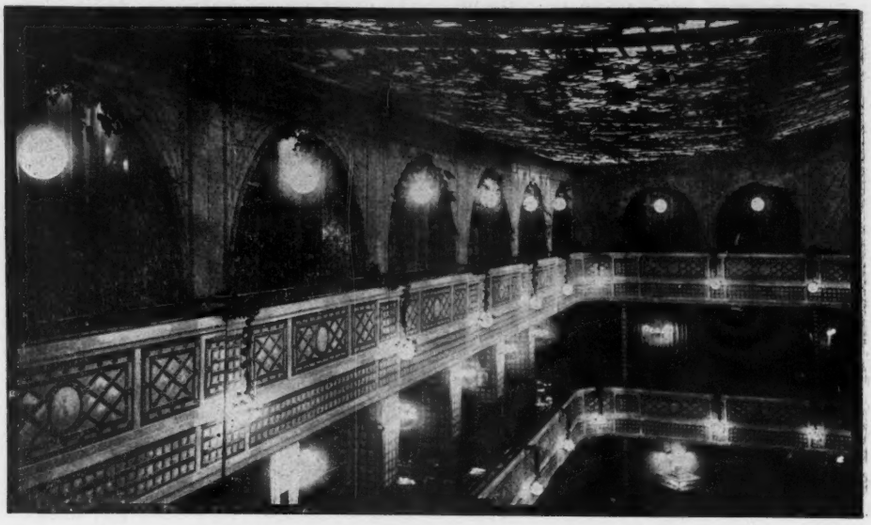
Car	No. of cylinders	Bore and stroke
Alcyon, 3,	4	2.9 by 4.3
Delage,	4	2.9 by 4.7
Demeester,	4	2.9 by 4.3
Gregoire,	2, 4	3.1 by 4.3
Rolland-Pilsin,	2, 4	3.1 by 4.3
Corre La Licorne,	2, 4	2.4 by 3.9
Corre La Licorne,	4	3.1 by 4.3
Sizaire-Naudin,	1	4.7 by 5.5
Hurtu,	1	3.9 by 4.3
Barre,	4	2.9 by 4.7
Doriot-Flandrin,	1	3.9 by 5.1
Turicum,	4	2.9 by 4.3

W. H. KIRKPATRICK RESIGNS

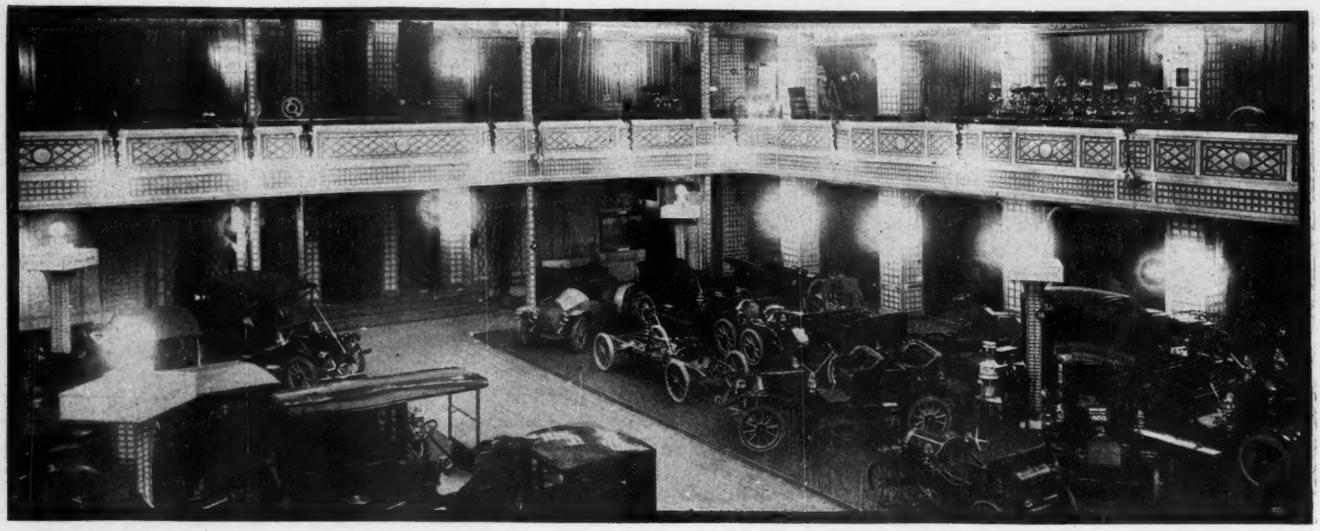
Cleveland, O., Jan. 3—Considerable surprise was occasioned in trade circles here by the announcement given out by W. H. Kirkpatrick that he has resigned his position as sales manager of the Peerless company. No statement as to his future plans have been given out by Mr. Kirpatrick, who long has been identified with the motor industry, having come in in the early days after a successful career in the bicycle business.

The Palace Show

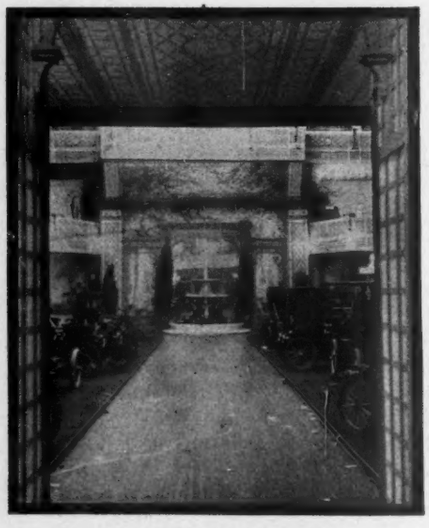
NEW YORK, Dec. 31—With the chiming of New Year's bells, which, in the interpretation of the immortal Tennyson, "ring out the old, ring in the new," and the predominant exhilarating atmosphere of a New York New Year's eve, the tenth international exhibition of motor cars was opened here this evening, under circumstances never before existing at the opening of this show. The recent court decisions in favor of the Association of Licensed Automobile Manufacturers has within the last few months of 1909 so altered the motor car map that although the present show is one promoted by the American Motor Car Manufacturers' Association, the Importers' Salon and the accessory and parts manufacturers, yet there are in it over a dozen and a half makes of cars which carry on their dashes the little licensed tag bearing the words "licensed under the Selden patent," which is but one more proof of the fact that seventeen of the independents have within the last few months cast in their lot with the licensed organization and there is a strong probability that before long a good few more of these stalwart makers of American cars will be allied and counted as members of the licensed array.



ARTISTIC EFFECTS SECURED IN CEILING DECORATION



GENERAL EFFECT OBSERVED UPON FIRST ENTERING PALACE SHOW



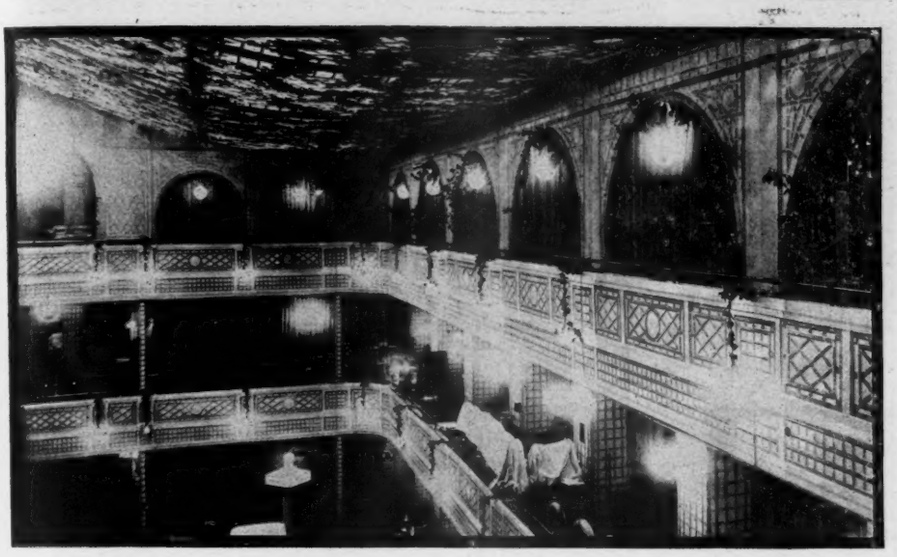
LOOKING FROM ENTRANCE

Opening Auspicious One

In spite of this condition of affairs the opening was an auspicious one. From the opening hour until the din of whistles and bells announced the completion of another cycle by Father Time the aisles and exhibit spaces were crowded with the usual first night, or paper-night, crowd, the majority more interested in a passing glance at the polished chassis and luxuriously-fitted cars than with the thought of making a selection for the coming season. It was a joyous, good-natured crowd, in which exhibitor, demonstrator, manufacturer and curiosity-seeker rubbed elbows and jostled one another, the thought that it was New Year's eve being more prominent in the minds of many than that it was the opening of the tenth international motor car exhibition.

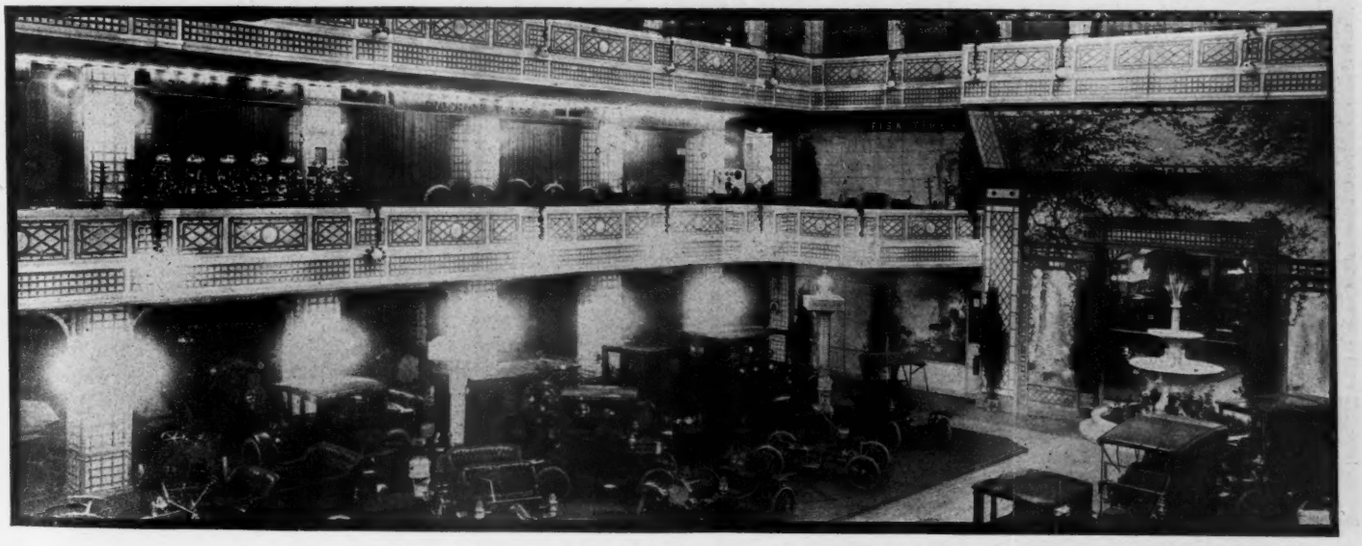
But while the holiday spirit reigned nearly supreme, there was a goodly quota of those interested ones, those who came to see and examine, if not to buy; and it is debatable if ever before on the opening day of a show was there a larger percentage of the live ones, as the manufacturers have dubbed the certain buyer, on hand. Considering the aggregate attendance of the day it was considerably above that of any previous opening day, the money taken in at the door—dollars and cents—being away in advance of last year. Not only

USUAL BIG SUCCESS



LOOKING DOWN UPON CARS AND SUNDRIES

When you enter you are on the basement floor and immediately climb a couple of narrow staircases, and make a right-angled turn into a central court which has room enough for eight exhibitors, two on each side of a central aisle and two others backing these up and facing, as it were, on a back alley. This court is three stories high and the first balcony is given over to accessory exhibitors, and the gallery is flanked by a few rows of benches on which the worn-out can recuperate. This is the central or north pole part of the exhibit. Surrounding it on four sides but separated therefrom by partitions are two rows of car exhibitors, forming as they do a hollow rectangle, with the ceiling not much higher than the tops of the limousines. This constitutes the first floor of the palace and here are to be found some of the big makes.



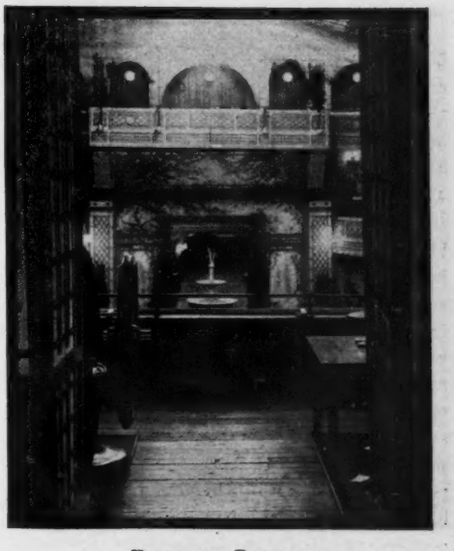
GENERAL VIEW OF MAIN FLOOR, SHOWING ENTRANCE TO HALL

was the paid attendance larger, but there was a larger report of out-of-town motor car agents at the show headquarters, Manager Alfred Reeves having followed this year as on previous occasions that excellent policy of sending an invitation to dealers located in all parts of the country, and which invitation carries with it daily admission to the show, when the dealer reports at headquarters, shows his credentials and is fitted out with his exhibitor's button. For a couple of seasons this scheme has worked with the greatest success and it is a safe prediction that this year before the show is well under way from 500 to 1,000 of these dealers will be on hand; many of them, it is true, will not report until later next week, their object being to see the closing days of this show as well as the opening ones of the Madison Garden exhibit, which will be conducted under the standard of the licensed party.

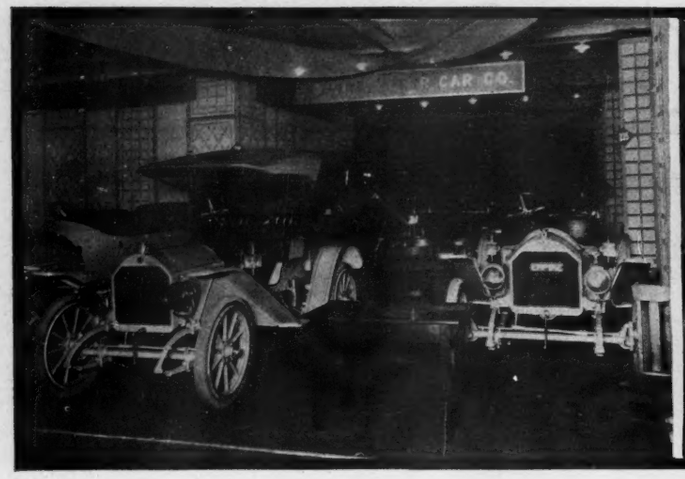
The Grand Central palace looked prettier tonight than at any previous show in its history. The palace, for the benefit of those who never have seen it, is a ramshackle building in which to expose the first wares of a mammoth industry; yet the management is deserving of every congratulation in the way the bald walls have been covered up without in any way infringing on the exhibit spaces.

A Series of Compartments

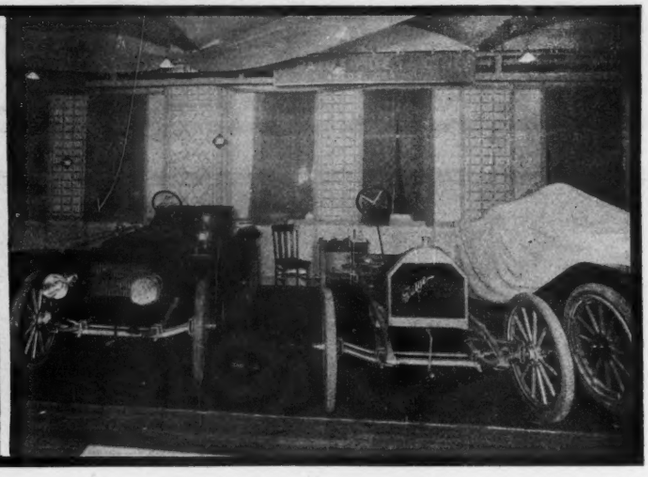
The palace is a series of compartments; to the metropolitan citizen it resembles a monster apartment building after a big holiday game of blind man's buff among the different apartments so that when the game ceased every one was out of its proper place, with scarcely a semblance of harmony existent.



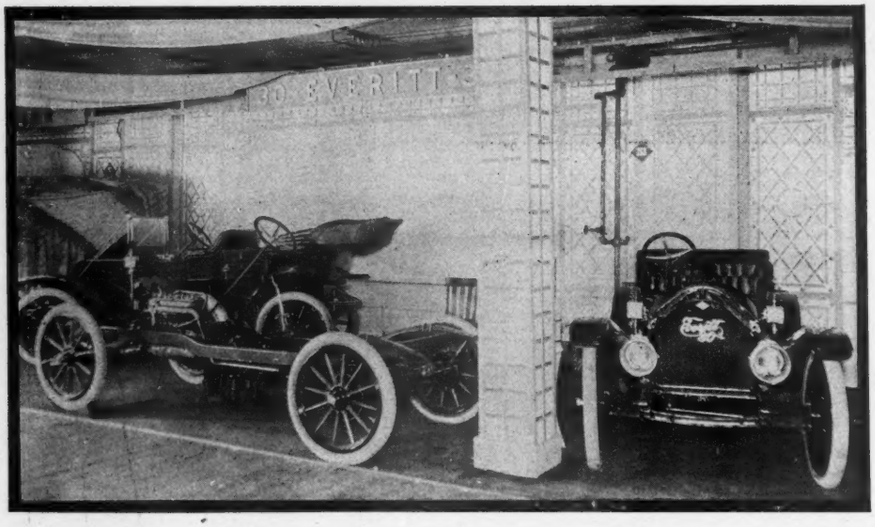
FROM THE BALCONY



OFFERING OF EMPIRE MOTOR CAR CO.



PAIGE-DETROIT MAKES ITS BOW



EVERITT, SHOWN BY METZGER MOTOR CAR CO.

Three New Cars On Market

The second floor coincides in every respect with the hollow rectangular space of the first floor and is given over to commercial cars, some pleasure cars and the accessory exhibitors who are members of the accessory association. The third floor is a duplicate of the second excepting that one end of the rectangle is cut off, and the other end and one side badly mutilated by the café quarters, the press room and the management offices.

Trellis Garden Effect

To decorate this labyrinth the architects have adopted a trellis garden effect, which is carried out to completeness in the main court on the first floor and which design, in one form or another, is consistently preserved on the second and third floor spaces to the farthest corner. This garden effect in general is one of a lattice fence, so common in landscape gardening. The walls are covered with this design, the pillars carry it in stencil, and the exhibitors' name posts in the main court are covered with it in barber-sign fashion, though without the bewildering rings. Were everything lattice it would grow monotonous, but the decorator has guarded against this by introducing panels showing landscape vistas, which are welcome spots in the big motor display.

The main court is more pretentious, with its garden fountain at one end spouting real water, and its overhead roof of truly rustic architecture. Taken all in all, the scheme is the most sensible ever used in this old building and is much in advance of the swaddling draperies of bunting that hung on every wall and ceiling a year ago.

Of course speculation is rife on every hand regarding the show situation of next year and particularly is Gotham disturbed over this condition. A week ago an announcement was made that Madison Square garden would be torn down during the coming season so that there would not be even a possibility of a show in that historic pile next year. Since then the report has been denied, but there is still good ground for the report of its destruction, although nothing will take place until the expiration of the present schedule of engagements in it, which will carry well into July. It is understood that the palace will come down, but that the owners of it are to erect a new building in which more adequate space for exhibitions of this nature will be incorporated. It also is a fact that the A. M. C. M. A. has options on the lease of this annually for the purpose of holding motor car exhibitions.

Wanted, a Big Building

The way the matter looks now, it seems that if the present members of the A. M. C. M. A. continue casting in their lot with the licensed party that there will not be any independent group by that time, as they all will have become one with the Madison Garden aggregation and in such case, the show problem would be readily solved. But then the greater question arises, namely, that of securing one building adequate to house all the makers in the industry. One solution advanced by some enthusiasts is to have the show next year extend over 2 weeks, with one division of cars exhibiting the first week and a different class the second week. It might be that cars up to $1,750 could be put on for the opening 7 days and all cars above this figure the closing 7 days. One objection immediately presents itself to an arrangement of this sort, namely, the fact that there are makers building cars below and above this dividing line, which would make it imperative for them to exhibit during both weeks. But future speculations may be left to other days when satisfactory solutions will be worked out by those whose duty it is to wrestle with such problems.

Old First-Nighters Absent

It has been noteworthy tonight that in many of the car exhibit spaces several of the heads who have invariably been first-nighters in previous years were absent tonight. At the start this was apt to be construed as a matter of lukewarmness,

but such thoughts were rapidly banished when the matter of Christmas holidays was mentioned and also when it was learned that the great majority of them are postponing their attendance until the middle of the show so that they will then prolong their stay into the first half of the garden exhibit. This policy undoubtedly will be followed by hundreds of out-of-town agents, curb-stone representatives and branch managers. The recent joining of the licensed association by seventeen or eighteen A. M. C. M. A. members has quite altered the face of the agency situation throughout the country, as many agents who heretofore handled only licensed cars will now be able to handle cars of these new members, which already has added 50 per cent to the Selden party. Such agents, with greatly increased lines, now will have to attend both shows and, of course, will take in only the end of the first one and the start of the second.

Although in its issue of a week ago Motor Age exhaustively reviewed the progress made for 1910 in the car and accessory field a few general observations as gathered from a stand-to-stand visit at the different booths may serve to fix in the mind more permanently the general lines of advancement made during the year.

Few Freaks Shown

First of it it is remarkable how few freaks are shown, in fact, there is scarcely one in the whole car exhibit. The foolish whims of petty engineers or designers, as they used to style themselves, are not seen this time like they were a year or so ago. Impossible systems of lubrication, mounting to motors in the chassis, fitting roundabout devices whereby the motor might be started other than by the crank, furnishing unheard of ignition systems, etc., are no more; they cannot be found this year. The maker has realized that the public can be fooled no longer with such prima facie failures. If he has not been able to realize this he has found that it is too expensive to build a poor car, that it takes more to keep it in any kind of commission after it has been sold, than it would have to originally make it a reasonably satisfactory machine.

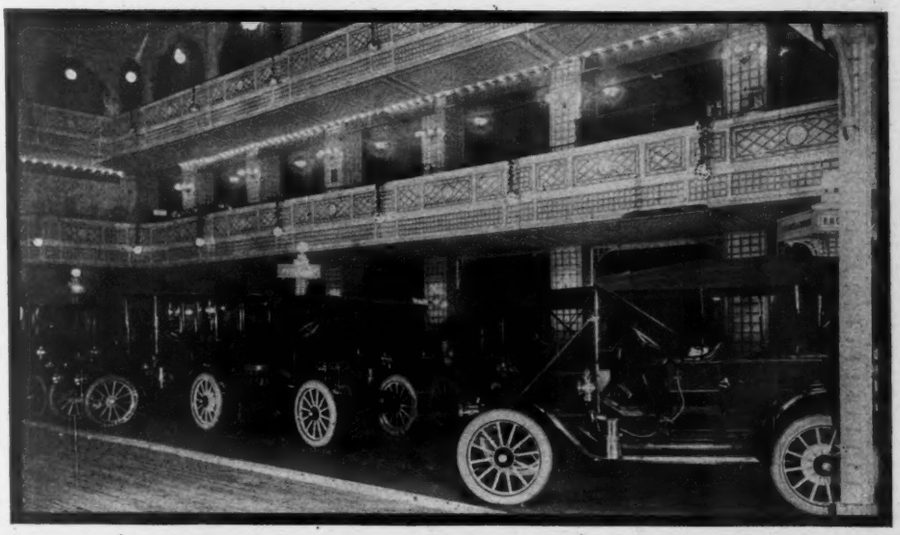
In short, it is quite a conventional lot of machines seen in the American exhibit spaces at the palace, with those characteristics of construction in minor details, that company's have made their own during the last few years. For example, the Chadwick six continues with its copper water-jackets on its cylinders, these being cast in pairs and one jacket serving for two cylinders; the Lambert and Carter-car people, old exponents of friction drive, are showing their same systems, with those detail improvements that the designers after the experience of a year have deemed necessary; the American Simplex company exhibits its two-cycle design in highly-finished chassis form as well as in luxurious body types, and in addition the Chase commercial car as well as the Paige-Detroit, a new pleasure car, have motors of the two-cycle type. The Atlas cars, in touring and taxicab types, are continued with two-cycle motors, so that numerically the two-cycle field has broadened within the last year.

Cooling of the Cylinders

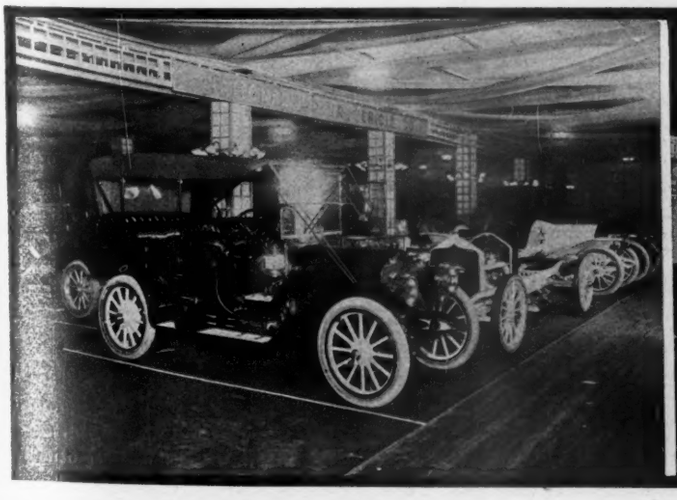
In the matter of cooling of the cylinders, there is scarcely a change seen in the show, The Cameron and Middleby, exhibitors of a year ago, show air-cooled designs and with these must be counted the two-cycle Chase motor used in trucks and the small motor emloyed in the little Metz car. The cooling scheme is still confined to integral flanges of one nature or another on the cylinders, the circular flanges having the majority of followers.

It is most conspicuous to everybody that there is not one motor buggy or high-wheeler seen in the show, although a year and 2 years ago these unique machines were shown in quantities and had a department all of their own. It is not, however, due to the fact that none of the makers of motor buggies is on hand, but rather that in the majority of cases these makers have added to their line real cars with low wheels and pneumatic tires, and

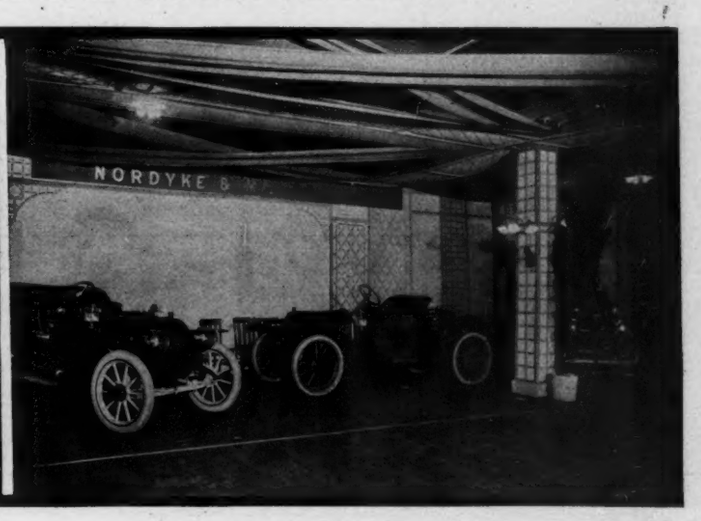
Veterans of Many Big Shows



WHERE THE REO HOLDS FORTH UNDER THE OWEN BANNER

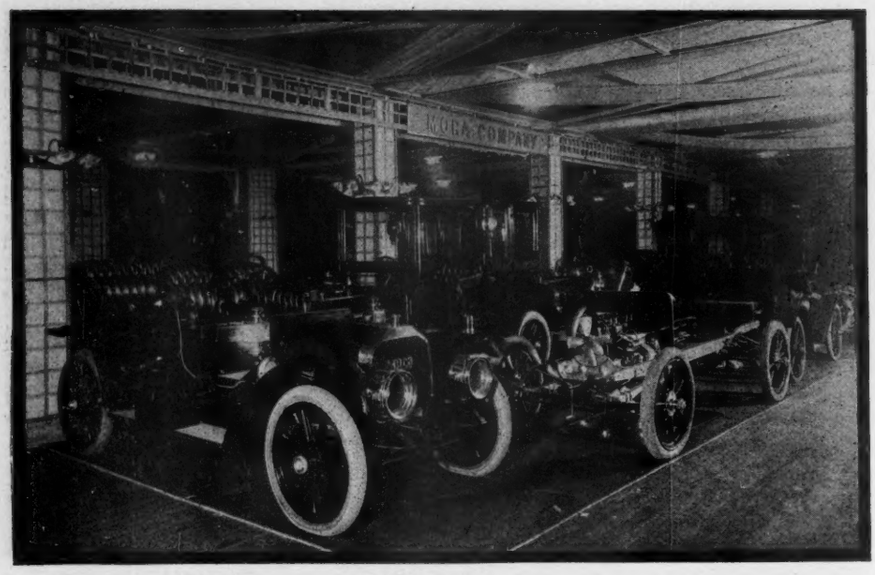


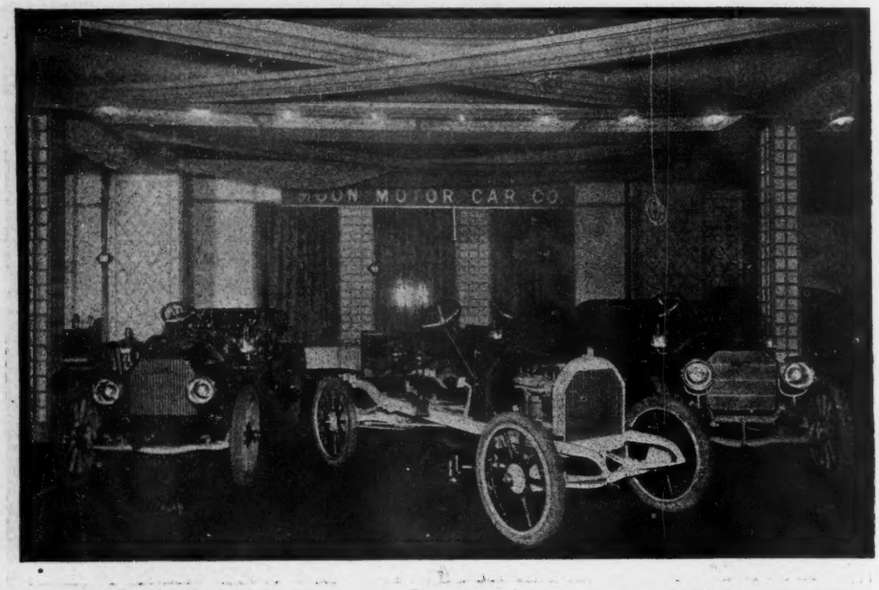
DISPLAY MADE BY THE NATIONAL COMPANY

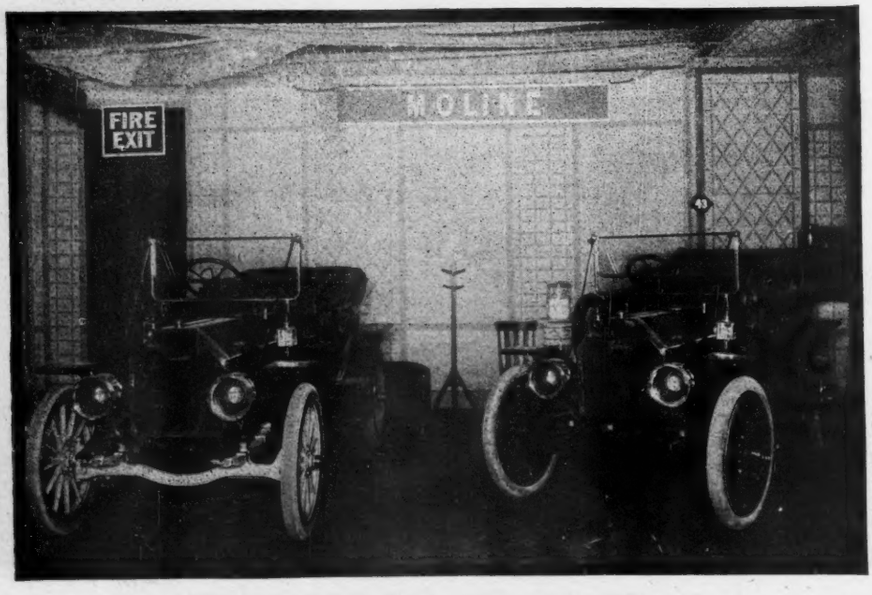


BOOTH OF THE NORDYKE & MARMON CO.

Mora, Moon and Moline On View







TOP, MORA BOOTH; MIDDLE, MOON; BOTTOM, MOLINE

where they are continuing their motor-buggy lines, they state that owing to lack of space they did not bring any of these machines to the show. The Holsman, the father of all motor buggies, is not at the show; the Schacht is here, but as a car; the McIntyre is a full-fledged car; so is the Staver; and so is the Black. This absence of the motor buggy is creating a lot of talk, many interpreting their absence due to the great production of low-priced runabouts and touring cars, with pneumatic tires and which list at from $500 upwards to $1,000 or thereabouts. It is rumored that the recent avalanche of low-priced runabouts has cut deeply into the motor buggy realm.

Torpedo Bodies Featured

Undoubtedly the feature event of the show, to the visitor who simply walks through to give a cursory examination to what the eye happens to fall upon is the torpedo body, of which there are four or five examples. It is questionable if the torpedo body will not result in about as big a jumble of nomenclature as have the high and low-tension magnetos of today. There are very few real torpedo bodies, in fact, it is questionable if there is one real case, in every sense of the term. It is not expected that by torpedo is meant a design that in case the owner got tired of locomoting himself around over country roads he could detach the axles and float it down the Mississippi or Hudson; yet it is expected that there must be one or at least two features that mark certain body designs as being torpedo and others as being just bodies, or perhaps abortions.

Makers might as well realize that in a torpedo body the radiator has not to be contorted into a fish-head shape, with eyes and gills; but that maker might as well realize that to just put high tonneau doors and doors for the front seat passengers on his regular touring type does not make a torpedo out of it. The torpedo is a design of its own, which design begins with the bonnet or hood, incorporates the dash, includes the front and tonneau part of the body, takes the rear of the body into consideration and does not neglect the running boards and fenders. Some of the torpedo bodies shown begin the torpedo effect at the dash, and carry it to the tonneau doors but entirely forget that the rear of the body must be somewhat altered. The result of this is that when you take a three-quarters front perspective of the body it looks well, if you shut your eye that takes in the bonnet, and when you move around to a three-quarters rear view you ask the demonstrator what has happened to the torpedo. The maker simply forgot to get it at the back also.

Fiat Shows Real Torpedo

The Fiat company had in its space tonight a real good torpedo design. Perhaps the Marmon people have started out with more originality than any others in developing this type of body. They apparently have forgotten there ever was a

tonneau body and have started out with the idea of making something to accommodate four people, two in front and two in the rear. The body design harmonizes from the radiator to the rear, there being no attempt to couple up a torpedo body and a tonneau or runabout car hood. The body sides are very deep and the seats placed very low in it. This effect is further carried out by the low top—a top in reality not low with respect to the seats but very low with respect to the tops of the sides of the body. There are but two doors, one at the left for the front seat passengers and one at the right for the rear seat occupants. The conventional running board is dropped, its only remnant being a small step at the rear seat door. The big fender is gone, being superceded by short-curved individual types for front and rear wheels. The dash is immensely hooded, coming back almost over the top of the steering wheel, and as the top extends forward away over the bonnet, the necessity of a wind shield is practically rendered unnecessary. A disfigurement on this body is a spare tire on the left side. Some place should be incorporated back of the rear seat, but as this Marmon is largely an experimental one it is to be expected that in the perfected design adequate tire carrying space will be provided.

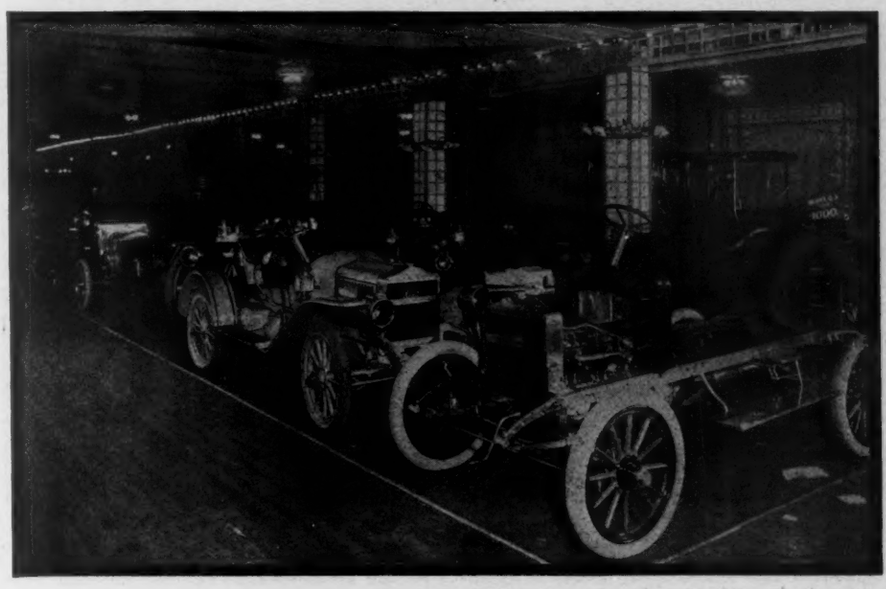
The Allen-Kingston shows a torpedo body from the dash rearward, and had the bonnet entered into the scheme, the result would be a pleasant one. This body has the torpedo rear in the form of a convex compartment, the curve from the top of the rear seat extending rearward and downward, much the same as the stern view of a torpedo boat. This extension offers space for baggage, but it is debatable if it is advisable to carry demountable rims so far in rear of the back axle, due to the side and vertical whip that this extension will be subject to.

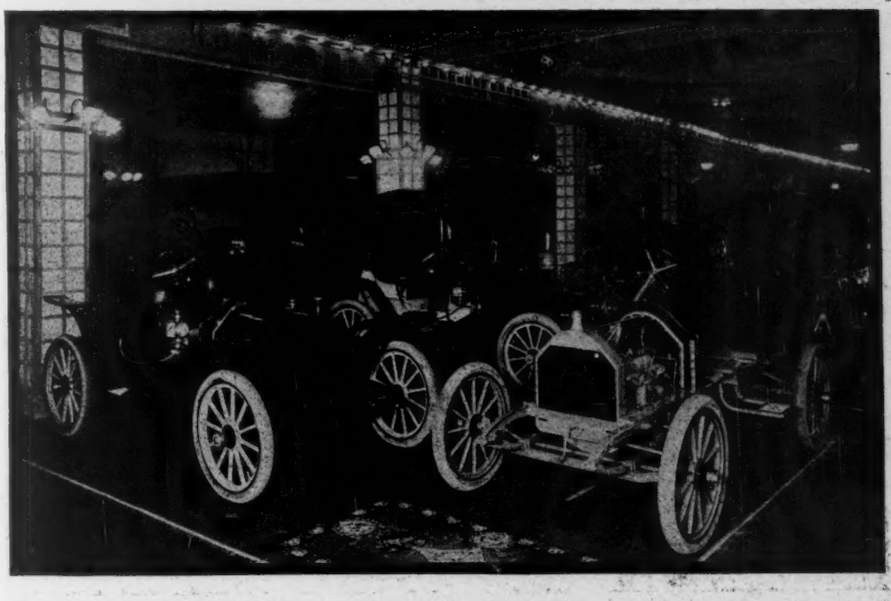
Semi-Torpedo Stoddard

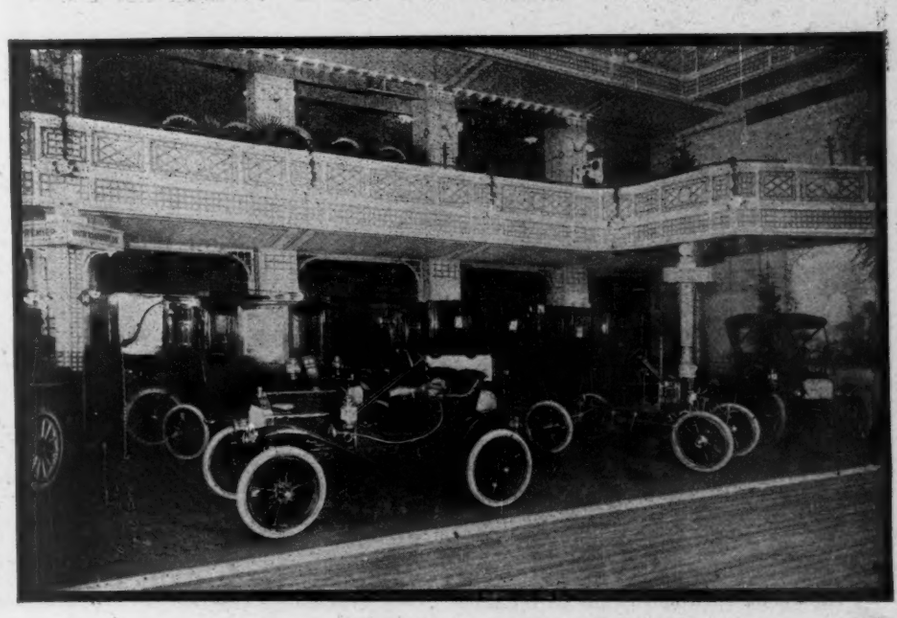
The Stoddard-Dayton is shown in semi-torpedo, this term being used because the torpedo effect has been produced by high tonneau and front seat doors, the top line of these being flush with the body sides and nearly on a level with the highest points of the seats, as shown in Motor Age last week. In this design the bonnet, however, is that of a regular Stoddard-Dayton, and the rear view of the tonneau is the same as that in the touring car. The side view of this model, however, is very pleasing and the heavily hooded dash aids in carrying out the torpedo scheme. One commendable feature in it is that the change speed and emergency brake levers are inside the body and the door fasteners do not show, being on the inside of the door and just low enough to be concealed by the door line. These fasteners are plain rings into which the thumb can be slipped, a rearward push being all that has to be done.

A Speedwell torpedo type, strictly in-

Maxwell, Hupmobile and Brush

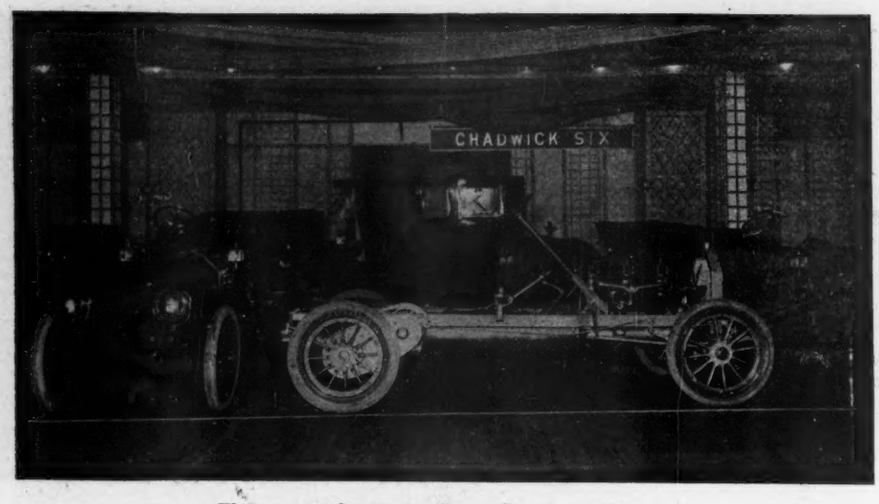






TOP, MAXWELL; MIDDLE, HUPMOBILE; BOTTOM, BRUSH

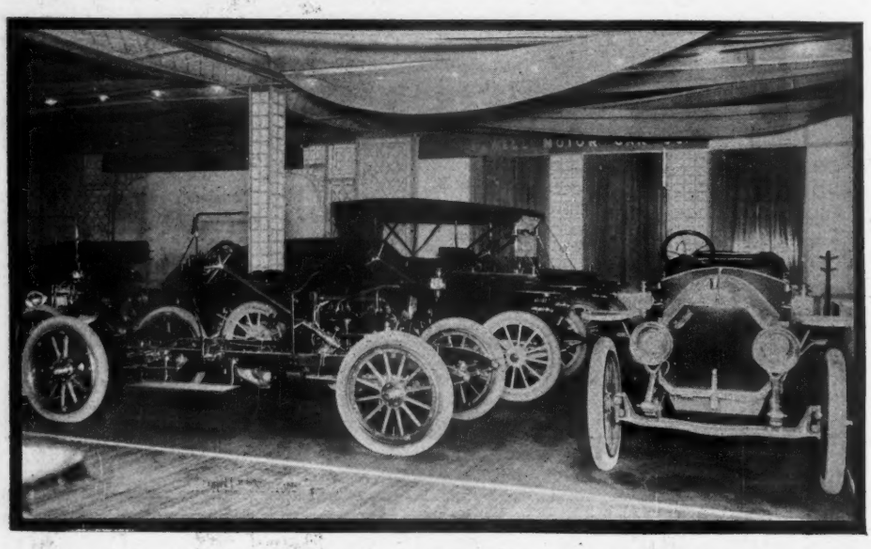
Chadwick—Speedwell—Klinekar



WHERE THE CHADWICK GREAT SIX IS ON VIEW

cluded in the semi-torpedo class, is exhibited. Like the Stoddard it is torpedo only in so far as the dash and side view are concerned, the rear view of the tonneau part being that of the touring car. The conventional touring car or runabout fenders are used in this new body construction.

Leaving the word torpedo out of consideration, there is a tendency to be more reasonable in body design. The side door to the front seat is coming and a year hence everybody will have it, whether the particular lines of body design are torpedo, semi-torpedo or plain touring car or runabout. The side door in front is a simple comfort in the first place and secondly it is a step forward in the progression of carriage builders art. Some makers think that a motor car must look mechanical or it is not right. This is not the case, as is borne out by the trends of the last couple of seasons. It is not necessary to have two long unsightly levers on the right side, when they might be replaced by smaller ones incorporated within the end of the front seat. The dash on some cars used to be a curiosity shop but now it is a clean-cut portion, with little more than a switch or speedometer showing, and in another year the speedometer will be sunk into it so that only the dial of it appears.



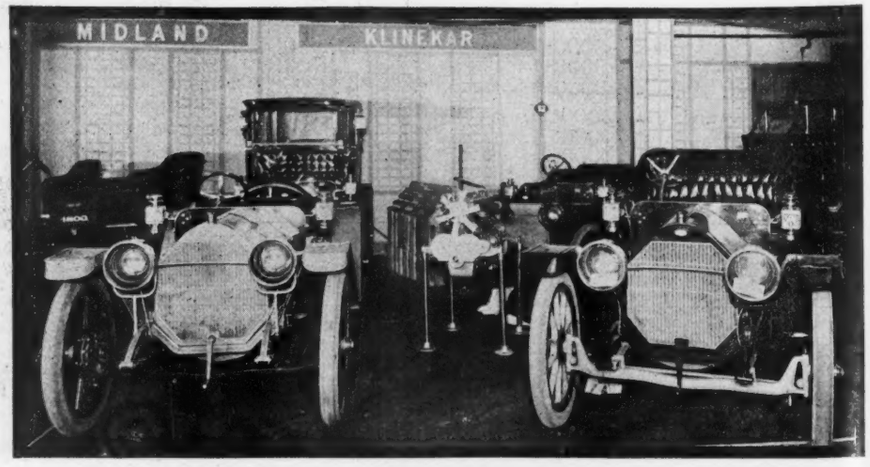
SPEEDWELL HAS A COSY NOOK IN PALACE

Art is bound to rule in the end, and manufacturers might as well set about the task today of getting a real harmonious body type as to wait a year or so until some real artist produces one and then set about copying what he has accomplished. Some of the runabout bodies shown are distortions, in that they offer little in the way of comfort to the passengers and absolutely nothing by way of baggage carrying facilities and the less said about the harmony of the lines the better.

Features of Enclosed Bodies

In the matter of enclosed bodies the foreign cars exhibited display in not a few cases some excellent points of sense, even if the design is not the most appropriate. In not a few cases these bodies have been built by American body builders. One notable example is the Lancia, fitted with a doctor's coupe or phaeton. It is a completely enclosed type with particularly wide doors. It has right-hand control and the two seats are big hotel easy chairs upholstered in whip cord. The driver's seat is in advance of the other seat and has a swinging seat part which tilts back, giving free ingress and egress at the right side, in spite of the presence of the steering column. Back of this seat is sufficient space to carry a suit case on end, or carry two or three physician's cases. On the dash are two or three compartments, fitted with locks, in which physician's necessities may be carried. At the driver's feet, on the dash, are three kick handles, controlling the electric lights, one to the headlights, another to the tail lamp and the third to an interior light showing on the dash.

On one of the Delaunay-Belleville's chassis is a novel type of seven-passenger body which is a convertible landaulet and touring car. The tonneau doors are full height with glass panels in the top half, and back of the driver's seat is a glass partition so that with this up and the doors closed, the cap top gives a complete landaulet effect. In fine weather, the door glasses drop out of sight and the frame work containing them folds away, as well



KLINEKAR IS A NEIGHBOR OF THE MIDLAND

Regal—Cartercar—Mitchell

as does the frame work of the front seat, leaving a complete open touring car when the top is folded back.

Limousine About the Same

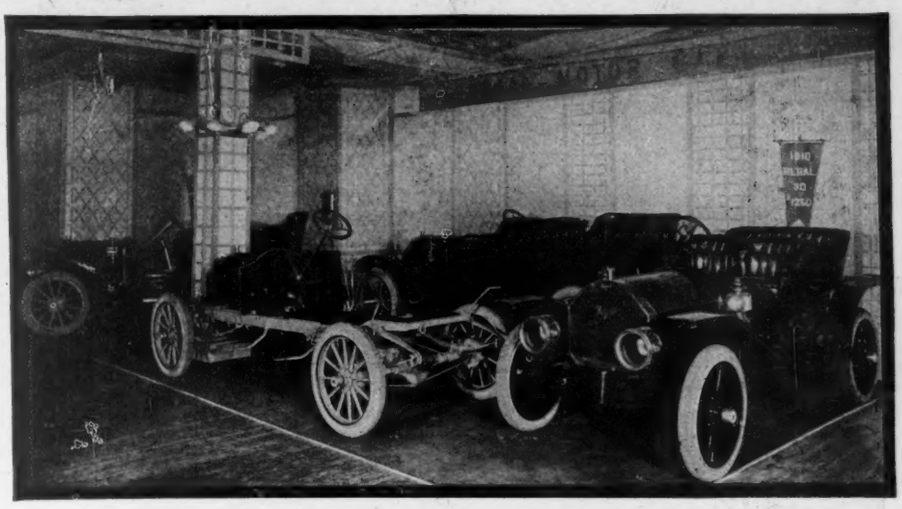
There has been a perceptible advance made in the matter of enclosed bodies of the limousine and landaulet type in both foreign and American makes. In the limousine little progress is shown excepting in that the doors are wider and the additional seats, giving accommodation for five in the enclosed compartment are more common. In the landaulet line a few seven-passenger types are shown, the majority of the makers heretofore displaying but five-passenger vehicles in this class. Whip cord has come to be the prevailing interior decoration, the padded-cell type of former seasons having now practically become obsolete.

Departing from this rather lengthy body consideration the matter of chassis construction offers a fruitful field for arriving at a few general conclusions. In the motor line a couple of tendencies are growing, the first is the onward march of the en bloc motor for small sizes and the second is the continuous waterjacket in motors with separate cylinder castings. Perhaps the latter is the more interesting and less has been said about it already. There are four examples of it at the show, one being the Panhard six, another the new Kline car, a third the Black Crow and a fourth the Pullman machines, the latter the pioneers in this line of construction, having used it for several seasons, although the external appearance of the Pullman motor is considerably different from that of the other three, all of which bear a striking resemblance to one another.

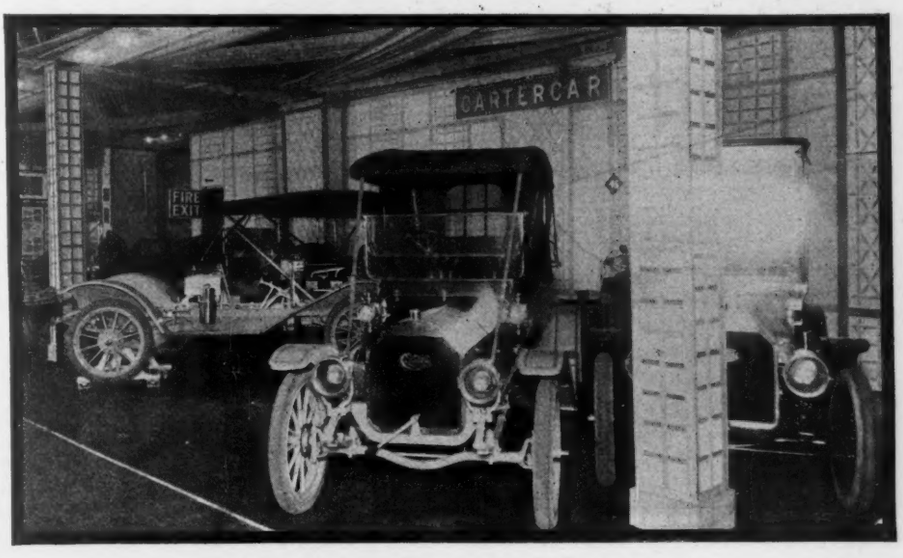
Features of the Motors

The casual and, in fact, the critical observer, would in taking a first glance at the Kline, Black Crow or Panhard motors pass the remark, "another case of the en bloc design," but they are not; rather the cylinders are separate castings, but bound so tightly to one another by a series of bolts passing from front to rear through the sides of all the cylinders that the line of union can scarcely be seen, and the result is a motor with individual castings and the compactness of the en bloc type. This is gained by casting the separate cylinders with opposite valve ports but without waterjacket outer walls at the ends. The end faces of the cylinders are milled off, as are the flange bases, and after a paper gasket is inserted these faces are brought face to face and bolted as already stated, the job being so neat as to fool hundreds of observers. The Panhard shows a six-cylinder of this type, the Kline car is also a six and the Black Crow a four. With this continuous waterjacket type of motor the water piping is limited to an intake into one end and an exit pipe to the radiator top. Some of these makes use thermo-syphon and others pump circulation.

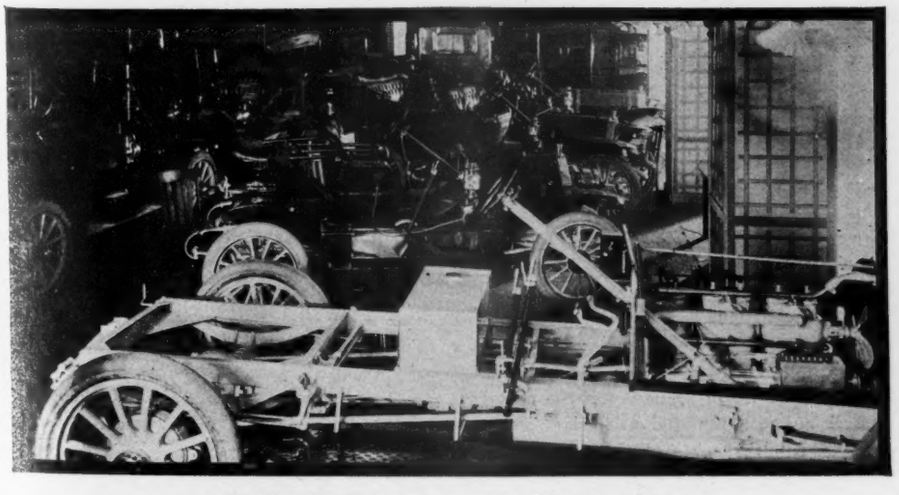
The en bloc motor has gained among American followers during the year and is unquestionably on the increase. The Lambert company shows it in some of its models, although the separately-cast type is shown on one chassis. The Ford was the original exponent of this type in America and still uses it on all models. The Jackson 30, a recent convert to this design, is on exhibition for the first time.



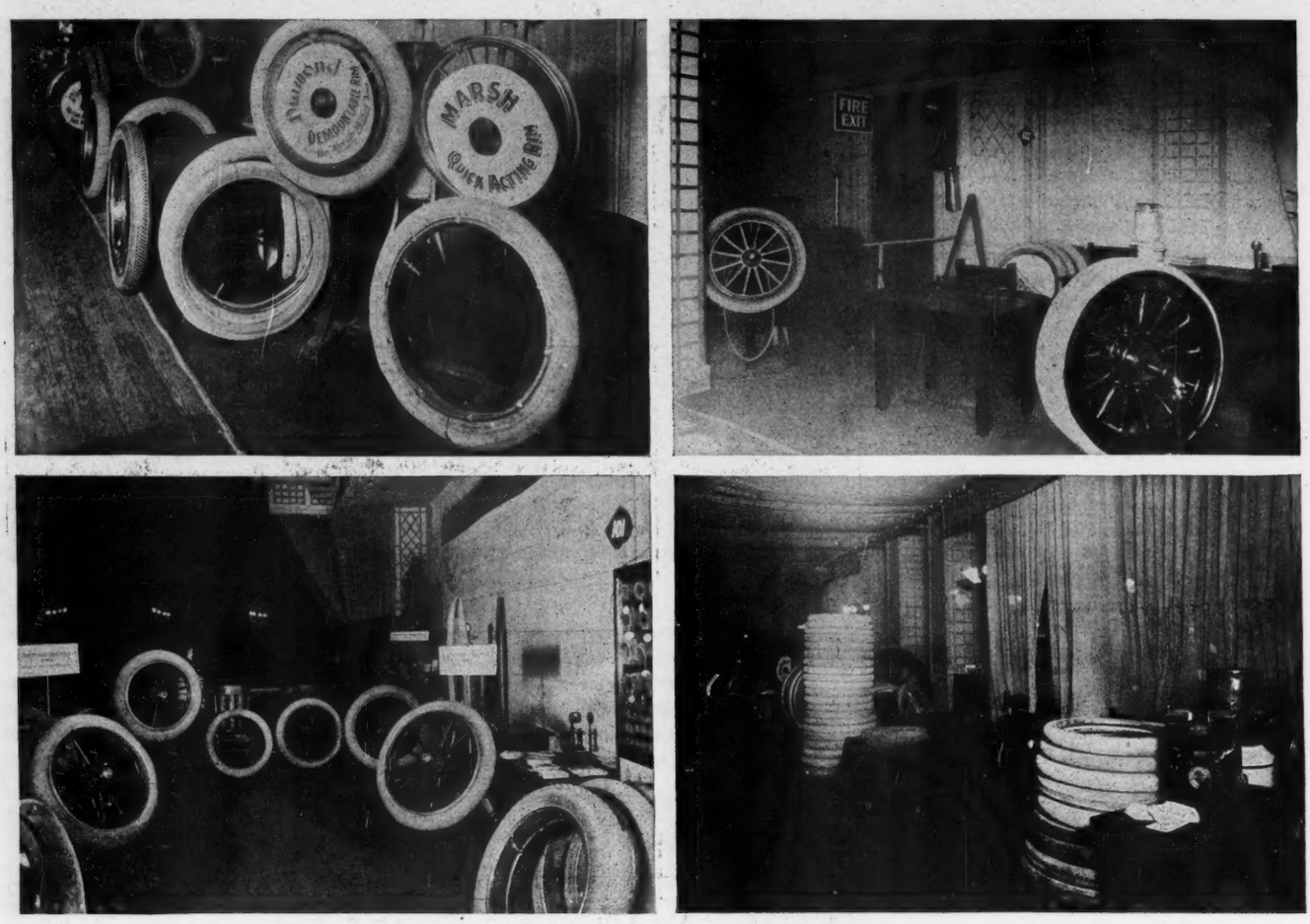
REGAL SHOWS CHASSIS AS WELL AS CARS



FRICTION-DRIVEN CARTERCAR WELL REPRESENTED



CHASSIS IS PROMINENT IN THE MITCHELL BOOTH



UPPER LEFT, DIAMOND; UPPER RIGHT, MORGAN & WRIGHT; LOWER LEFT, GOODYEAR; LOWER RIGHT, FIRESTONE

Exhibits of Four Leading Makes of Tires

The new Everitt car is a neat en bloc job with cylinders of the L type and regarding which more will be given in a later issue. The new Courier uses this method of casting, as does the new Empire, both of which are seen at a palace show for the first time. In the foreign department this variety of motor is much more common, it being, in fact, considered only correct to use this type in small motors. The Lancia, Renault, and C. G. V. are examples of it.

Among the Foreigners

In the foreign motors it is interesting to note the preponderance of the two-cylinder vertical type in small cars used for taxicab and like purposes. The Delahaye and Renault show neat examples of this type. The Delaunay-Belleville is the only example of a six-cylinder machine in which the cylinders are cast in two groups of three each. The C. G. V. cars are now of Renault design in that the radiator is placed where the dash is ordinarily mounted and in the center of it is mounted a rotary blower, driven by belt from the flywheel, this blower creating the air circulation through the bonnet and out through the radiator. This sytsem differs from the Renault, however, in that, on the Renault the blower takes the form of peripheral blades on the flywheel. The bonnet design in both is similar and thermo-syphon circulation is used.

The observer is everywhere impressed with the improvements that have been made in frames for 1910. Many are aware of the troubles that not a few makers have had with present models, owing to the side members of the frames being too light and sagging before the season was half over and eventually breaking. For 1910 this trouble will not occur with a few good makers who were caught napping this year but who now show beautifully designed side members with deeper channel sections and with channel lips that taper gradually from the rear to the dash, where they attain their maximum width, and gradually reduce to normal at the front ends. The stock in these frames is heavier than last year, and cross members are heavy channel parts. Then, too, a better design has been accomplished by a double drop in the side members at the tonneau door, making the extra step above the running board unnecessary and allowing of introducing the three-quarter elliptic spring—which is everywhere—without raising the suspension of the body in the least.

The improvements which have been made in lubricating the various cars shown at the palace are referred to in detail in another part of this issue. The magneto is now paramount, and although early in the season one or two makers announced the adoption of new systems which gave some reality of superseding the magneto in a few quarters, they have now returned to the trustworthy magneto. The dual system is gaining, with the double system a loser. Shaft-drive has of late become such a standard that reference to this phase of the problem is scarcely necessary. The Chadwick uses side chains with chain housings and on two small cars, the Brush and Empire, side-chain drive is used, the Empire housing the chains.

Improving Mechanical Details

Gradually step by step the shaft-drive and live rear axle systems are being improved. Makers who heretofore thought radius rods unnecessary are now fitting them in many cases, and the wee puny torsion rod of previous years has become a real stalwart member, one that looks the part and appears to be a useful and integral portion of the chassis. In designing the rear axle housing, stampings are com-

ing to the fore, although not so rapidly as was expected. The Fiat easily leads in this respect in that the top half of the axle housing and the torsion tube enclosing the propellorshaft are one, as are these parts in the lower half. The old-time method of riveting and brazing axle tubes into differential housing has ceased and now the differential is made with good big flanges so that the axle tubes can be attached with real bolts and a reliable job insured. The truss rod beneath the axle is not so common as it was, the use of internal ribs, to some extent, accounting for its elimination.

After viewing the show today Charles E. Duryea, one of the veteran motor engineers, aired his views on the tendencies as he had observed them, as follows:

"Several things have conspired to force the season of 1910 to the front and permit at this date a better view of the coming year than is usual at this period of the year. The shortage of goods during the past summer cleared the factories and permitted the new product to come out sooner. The absence of vehicles on the sales floors of agents caused them to ask for the new product instead of asking that it be held back till the old ones were sold. Several interesting and pleasant things are to be seen in this early view of the industry.

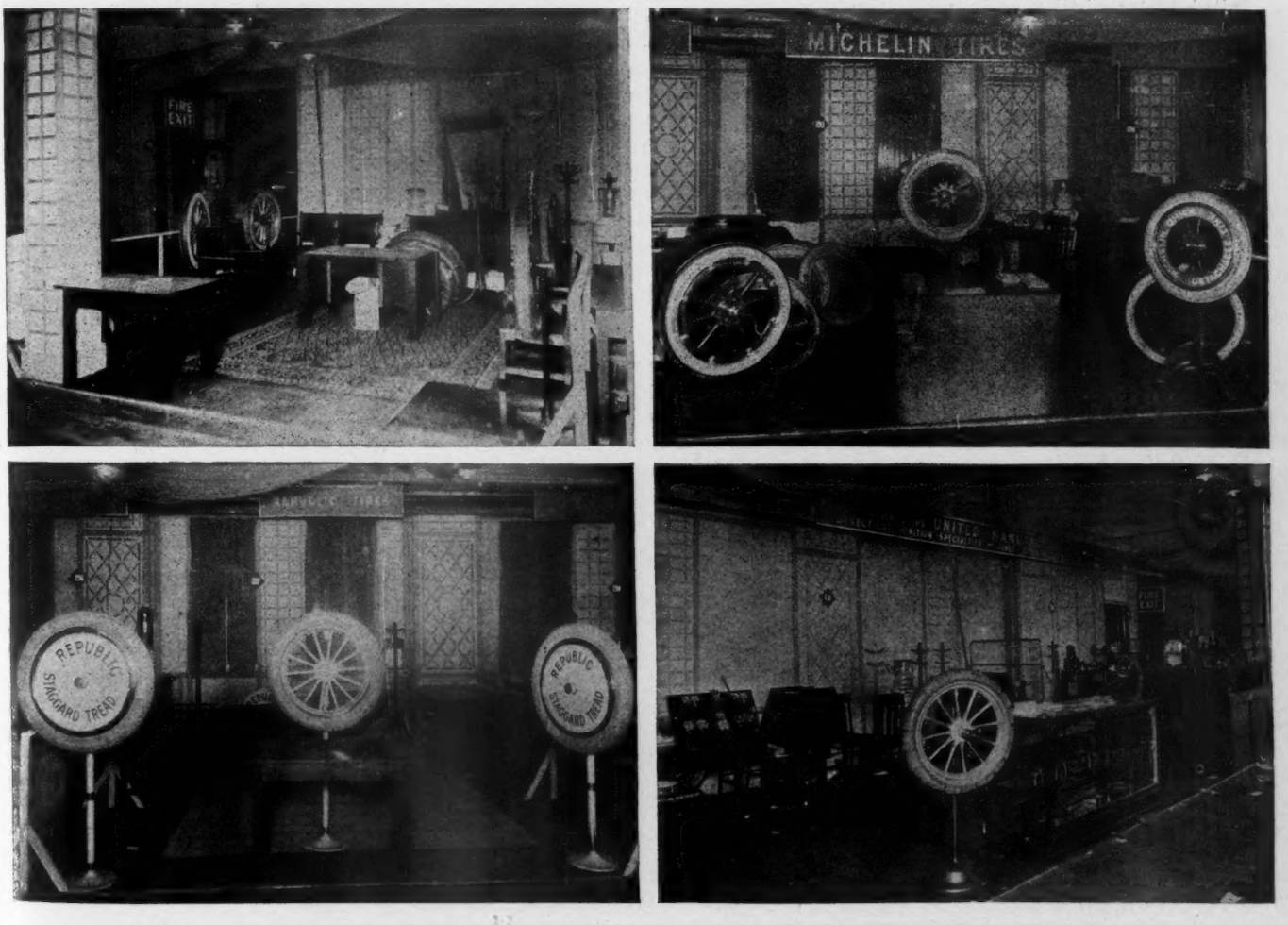
"A reversal of policy shows plainly in many cases. Instead of striving to get the product down to the market as seemed to be necessary a year ago, the market now looks so different that the product is being pushed upward both in quality and price. Even many of the makers who were building or looking with covetous eyes on the motor buggy as a product for the lowered market, have now abandoned it and are marketing the conventional motor car. The country buyer who feared to buy or had not the money to buy the pneumatic-tired touring car a year ago, was then looking for some cheaper substitute. With the return prosperity, high-priced wheat, corn, cotton and beef, the buyer is looking for service, style and luxury and everything that is best in motor car construction.

"The economizing period through which the industry has just passed taught the value of light weight. The reduced tire and maintenance expenses of the lighter cars has been very marked and has done much to widen the range of buyers. And it is a well-known fact that once a man enters the ranks of the users, he is not happy until he has crept to the top and driven the most elaborate productions he can find. This simple fact alone does much to stimulate designers to produce for this year better creations than they had before.

Tendencies Are Noted

"Because of these things we find wheelbases again moving forward. It seemed as though these had reached the extreme and would follow a downward course, but aside from the short-coupled town cars this seems not to be the case. Thus the Moline touring car and baby tonneau now uses a wheelbase of 110 inches instead of 107; the 45-horsepower Moon is now 120, but was heretofore 112; the Pullman is now 112 inches, whereas it was but 107; the Mitchell is now 115 in the five-passenger touring car instead of 106; the National has been raised to 125 inches from 115; the Overland base has been lengthened from 108 to 112 inches; the Cartercar has raised both models from 94 to 103 and from 103 to 110 inches; the Mora base has been extended 2 inches; being now 112; the Glide has jumped from 106 to 120, while the Speedwell has only raised from 120 to 121½; the Austin has raised from 130 to 134, while the Reo has also raised to 108, from something like 100 last year."

Prominent Among Accessories Exhibitors



UPPER LEFT, CONTINENTAL; UPPER RIGHT, MICHELIN; LOWER LEFT, REPUBLIC; LOWER RIGHT, UNITED MANUFACTURERS

NEW SUITS IN STUDEBAKER-E-M-F LEGAL WAR

DETROIT, Mich., Jan. 4—Litigation between the Everitt-Metzger-Flanders Co. and the Studebaker Automobile Co. continues merrily, the past week having seen the inauguration of three new suits, with excellent prospects of a fourth. The E-M-F has not yet lost a battle, however, and is selling cars and signing agents at a clip which demonstrates the popularity of the product and the universal prosperity of the industry, as mirrored in the demand for the cars.

The dismissal of the injunction proceedings by Judge Swan more than a week ago left the slate of the two companies clear for a short time, so far as pending legislation was concerned. The remainder of the week was featured by little of importance aside from the selling department of the E-M-F, which was prodigiously active. On Thursday the Studebaker attorneys appeared at Kalamazoo and, in the United States court, Judge Severens presiding, requested an injunction which would prevent the E-M-F from marketing its own output in defiance of a contract existing with the Studebakers. The request differed but little from the one argued several days ago in the same court, and the injunction was refused. The next attempt was made at Cincinnati, where, in the United States district court, application was made for a similar writ before Judge Warrington, of the United States court of appeals. Judge Warrington set Thursday, January 6, as the date for argument. The data on which the action is based differs but little from that which has figured in the prior litigation.

E-M-F Takes Offensive

On Friday the E-M-F took the offensive for the first time in the progress of the legal battle, the stockholders in the Detroit company requesting the Wayne county circuit court to dismiss Messrs. Eames, Fish and Studebaker as directors of the company. The suit is based on an almost forgotten Michigan statute, giving a circuit court right to take such action in the case of a Michigan corporation, the directors of which can be proven guilty of conduct not justifiable as in the interests of the company. The complaint is made that the gentlemen mentioned, in direct prejudice to the interests of the E-M-F, were really planning to bring about its downfall in order that it might be purchased at advantageous terms by the Studebaker Automobile Co.

On Monday the Studebakers filed the long-heralded suit for damages against the E-M-F. This was combined with a request for a permanent injunction, restraining the E-M-F from disposing of any of the cars built at its factories, to any persons other than the complainants. The alleged damages are placed at "$2,000 and over," and the action, according to agreement, was brought before Judge Swan, of the United States court in Detroit. No definite date was set for the opening of the arguments of this case. General opinion seems to be that this case will be the one which will see the legal battle fought out to a finish, with all other suits valuable only through the embarrassment they may cause the defendants.

Another Move Pending

One more action will probably be begun within the next few days. This will be the result of the present desire of the E-M-F to break the stock pool which was formed several months ago, when all the firm's stock certificates were deposited with the Union Trust Co., of Detroit, the object at that time being to make impossible any sale of stock to outsiders, notably the General Motors Co., which was mentioned at one time as a possible purchaser.

One of the most important factors in the case has been the change in the attitude of the Studebaker company toward the retailers who desired to secure cars from the E-M-F company, though bound to prior contracts with the Studebakers. When the litigation was commenced, the Studebakers warned agents against purchasing of the E-M-F, and made the definite promise that the dealers would be cared for. Several days ago this policy was changed, and dealers having contracts with the Studebakers were urged to go ahead and get their cars if possible from the E-M-F company. This was, it is believed, for the purpose of freeing the dealers from embarrassment which might give rise to financial loss and an endeavor to recover damages from the Studebakers, who were as bound to furnish the cars as were the agents to accept and pay for them. As a result, the E-M-F salesroom was crowded with dealers, in many cases the former representative of the Studebakers, who were compelled to fight for the E-M-F contract with one or more rivals in the same city. On one afternoon six San Francisco dealers were at the factory, all of them anxious to secure the line, and the same was the case in less striking instances with other cities.

Former Studebaker Agents Favored

In general the E-M-F has been favoring the former Studebaker distributors. This tendency has been occasioned by the fact that these dealers usually were E-M-F distributors in the first place, being turned over to the Studebakers with the contract by which the latter secured the right of general sales agents. The E-M-F people also took into consideration the fact that many of the dealers, unable to secure a substitute for the line which they had planned to handle, faced very severe financial difficulties in the refusal of the E-M-F to fulfill the duty which the Studebakers had promised to perform.

To facilitate the work of completing the sales department, the new garage at the E-M-F factory was hurriedly fitted up and the offices adjacent occupied by the selling staff and the officers of the company. The appointment of B. W. Twyman, formerly of Indianapolis, as sales manager, was announced, with Harry Cunningham, of Detroit, as assistant. A telegraph office was installed in the factory and every possible effort was made to secure freight cars to ship out the cars which had been contracted for. Within the last week the shipping department had reduced the cars stored during the pending of the first injunction suit from over 800 to fewer than 200. The factory output was reduced at the main plant from sixty a day to forty, pending the resumption of normal shipping and storage conditions.

MAKES A HARD CENTURY

Chicago, Jan. 3—Only one motorist was able to make the Elgin-Aurora circuit on the annual New Year's century run of the Chicago Automobile Club, because of the adverse weather conditions that confronted the runs and tours committee on New Year's eve. Reports of New York-Paris race conditions in the open country caused the committee to abandon the attempt to drive to the Fox River Country Club for the annual breakfast and instead thirty-five members made the trip by trolley. Not so however Adolph Monsen, who ran second in the Indiana trophy road race last summer and who was determined to gain renown by performing a feat considered too difficult by others. In a 40-horsepower 1910 Marion and accompanied by three friends Monsen left the club house shortly after midnight, but it was not till 6 o'clock Sunday morning, 30 hours after, that he returned. It had taken him all that time to go that 100 miles because of the deep and drifting snow and an accident which caused him to spring a shaft. Monsen's car was equipped with a home-made snow plow and this undoubtedly was of great assistance to him, for two other cars, a Moon and an Oakland, stopped at Addison, 20 miles out, after having been buried in a snow-drift for 2 hours. A. M. Robbins, in charge of this expedition, did not fancy shoveling his way around the circuit, so he retired gracefully from the contest.

COLUMBUS SHOW SUCCESS

Columbus, O., Jan. 3—While the attendance was not as large as was expected, the first show given under the auspices of the Columbus Automobile Club, which closed New Year's night, was a success, thanks to the work of the committee on arrangements. The general understanding is that the show will be repeated next winter. It is believed fully $65,000 worth of cars were sold during the week and in addition many prospects were secured.

GENERAL MOTORS' 1910 PLANS ANNOUNCED

FLINT, Mich., Jan. 4—A summary of the 1910 plans of the General Motors Co., announced after a final review of manufacturing conditions at the various plans of the corporation, places the total cars which the various factories will put out during the year at 68,700, which will be divided among the various factories at the following ratio:

Buick, Flint, Mich.	43,150
Cadillac, Detroit, Mich.	10,000
Oakland, Pontiac, Mich.	7,000
Oldsmobile, Lansing, Mich.	2,000
Elmore, Clyde, O.	1,600
Rapid, Pontiac, Mich.	1,600
Cartercar, Pontiac, Mich.	1,000
Reliance, Owosso, Mich.	1,000
Welch-Detroit, Detroit, Mich.	600
Rainier, Saginaw, Mich.	500
Welch-Pontiac, Pontiac, Mich.	150
Ewing, Geneva, O.	100
Total	68,700

The big factory of the Buick Motor Car Co. here will be greatly increased in a few weeks by the completion of four enormous additions which, when added to the plant of the company, will give it a floor space of 44 acres. In spite of the extremely cold weather of the past 3 weeks, work has been progressing at top speed, even the bricklayers continuing at their posts through the zero weather. The additions comprise a building 800 by 360 feet in size, which will be devoted solely to the manufacture of motors. It is said to be the largest building of its type, devoted to the manufacture of one article. The sum of $70,000 has been expended on the floor alone, the solid base on which the machinery will be installed consisting of successive layers of cinders, cement, soft wood and high-grade hardwood flooring. The building is of sand brick, like the rest of the factory construction and is one story in height, with saw-tooth roof.

Some Buick Buildings

Almost as imposing in size is the building which will be devoted to the production of sheet metal. This is 830 by 152 feet in size and of similar construction and type. Another building, 800 by 74 feet, is well under way. This will be devoted to the assembly of the light, double chain drive runabout which the firm will market in large numbers during the year. This building will be three stories in height, like the present buildings of the plant, the Buick maintaining its policy of limiting all possible operations on each model to the one building devoted to that purpose. At the Buick a new model means a new building.

The fourth addition is a hardening room, 311 feet by 70, in which, under the direction of P. F. Rickhelm, president of the American Gas Furnace Co., an absolutely new, though thoroughly tested, system of hardening is being installed. As soon as these new buildings are completed the Buick staff will start installing the machinery, which is already arriving in daily installments. The contemplated additions to the big plant will bring the firm's roll of employes up to a total of 9,000.

The 43,150 cars which will be marketed this year by the Buick will be of seven models. Largest in number will be the light, double-chain drive runabout mentioned above, for which the firm has made contracts for material for 10,000. An equal number of the model 10, 20-horsepower car will be made. There will be 8,000 of the model 17 30-horsepower cars and 6,000 model 19, 24-horsepower. The firm also will market 5,000 delivery wagons, this being largely in the nature of a new departure. It also is interesting to note that the firm has not entirely ceased the manufacture of the two-cylinder opposed model on which it founded its original reputation three seasons ago. In an improved form the Buick will produce 4,000 of these cars. Until the Welch-Detroit factory is completed, the Buick will, on a small scale, manufacture 150 cars of that type. They are equipped with 40-horsepower motors with four cylinders and are seven-pasenger vehicles.

Big Buick Pay Roll

An idea of the immensity of the Buick plant may be gleaned from the fact that its payroll will come close to $400,000 a month during the coming season, for which it has already made arrangements for a total budget of $20,000,000.

The basic plan of the General Motors Co. is becoming daily more prominent. Mechanical experts, purchasing agents and other officials of the subsidiary companies can always be found at the local headquarters, consulting with the department heads on the details of design and manufacture. A new testing department is being established in charge of a chemist of national reputation, at which samples of all material, notably the metals, will be submitted to rigid investigation and where the firm will maintain a metallurgical experimentation bureau. Designs of all the General Motors cars pass through the hands of A. P. Brush, chief consulting engineer, for ratification and plans for the standardization of parts are progressing steadily to a point where it is said that, as soon as the Detroit parts factory is in operation, as many as 3,000,000 duplicates of a certain plug will be made, fulfilling the same purpose which twenty or more plugs of various sizes have performed in the past. In every way possible a general policy is being pursued which will assist in the standardization of details, while retaining at the same time all the valuable original features of the various types of cars.

The plans of President Durant are further mirrored in the manner in which supplies and parts are being delivered at the various factories of the General Motors Co. In addition to the Michigan Auto Parts Co., the Northway Motor and Mfg. Co., the Jackson-Church-Wilcox Co. and the Michigan Motor Castings Co., which are controlled by the General Motors, there are a large number of subsidiary concerns manufacturing parts, in which the General Motors is a heavy stockholder, although the fact is not known by the public. All these factories have large contracts with the General Motors, which has first call on the output and is naturally in a far better condition to combat a famine of parts than are manufacturers compelled to make contracts with firms in which they are not interested.

While the Buick will be in 1910 by far the largest producer of the General Motors group, the Cadillac retaining its position as second, there has been a huge expansion in productive facilities all along the line. Most prominent is this the case at the Oakland factory in Pontiac. This concern is now in its fully-equipped new factory, which affords a floor space of 225,000 square feet, and is prepared to manufacture 7,000 cars in 1910, of which 3,000 will be of 40 horsepower, the remainder being of 24. Both will be equipped with four-cylinder engines and the firm now has 1,000 men at work. The Cartercar facilities have also been much enlarged and plans have been made for an output of 1,000 friction-driven cars from a factory with 180,000 feet of floor space. The new Rapid factory, also in Pontiac, will be one of the largest manufacturers of trucks in the country in the coming year. Its concrete, fireproof factory includes 250,000 feet of floor space, supplemented by a fine new power plant. The firm will feature a 1-ton truck of which 1,000 will be built. Three hundred 3-ton type and an equal number of 5-ton trucks will also be made.

Other Plants are Busy

The Reliance factory at Owosso will devote its energies exclusively to 3 and 5-ton trucks in 1910, and will put 1,000 on the market. The Oldsmobile plant at Lansing will produce 2,000 six-cylinder high-powered cars and the Marquette factory at Saginaw, 500 of the Rainier model. The Welch-Detroit also will cater to the trade of those desiring a large car, with an output of 600 from the factory, in which machinery is being rapidly installed under the manager of A. B. C. Harvey, of the General Motors staff. The Welch-Pontiac and the Ewing Automobile Co. of Geneva, O., will be the smallest producers of the General Motors group, the former's output being estimated at 150 high-power cars, while the latter will manufacture 100 taxicabs.

The Elmore plant at Clyde, O., will be operated in 1910 for the first time by the General Motors, along the lines formerly followed by the original management. The firm's output will be equipped with two-cycle motors exclusively and the plant will produce 600 three-cylinder models and 1,000 two-cylinders.

Among the Makers and Dealers

Alco Rumor Heard—Rumors are afloat around Scranton, Pa., to the effect that several buildings in that city owned by the American Locomotive Co. are to be converted into a branch factory of the main works at Providence, R. I.

Horner Pulls Out Plum—An important position on the executive staff at the plant of the Rapid Motor Vehicle Co. in Pontiac, Mich., has been assigned to George A. Horner, who assumed his duties as factory manager January 1. Mr. Horner will have entire charge of the production of the factory and the completion of the additions now in the course of construction.

Big Order Filed—The Michigan Motor Car Mfg. Co., of Detroit, Mich., closed a contract with E. H. Ervin, of 1526 North Broad street, Philadelphia, Pa., extending over a period of 5 years for the exclusive sale of Michigan six-cylinder cars for the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, a total of 1,900 cars at a valuation of $3,040,000.

Plant Not for Sale—The American Motor Parts Association is reported to have made a very liberal offer for the purchase of the plant of the Driggs-Seabury Ordnance Corporation, at Sharon, Pa. The offer, however, was rejected and John Stevenson, Jr., president of the Driggs-Seabury concern, says positively that the plant is not for sale. Since the firm started making parts its shops have been running day and night and it has orders for many months to come.

Excelsior in San Francisco—The Excelsior Supply Co., of Chicago, has established a wholesale branch in San Francisco, under charge of T. A. Skinner, formerly general sales manager of the company. The company will confine itself wholly to the wholesale business, jobbing among the local and coast retailers. It is probable arrangements will be made with some big local accessory house to carry the special lines of the Excelsior company. The concern is located on Golden Gate avenue, near Larkin.

Tire Strike Continues—The strike of the tire makers of the Hartford Rubber Works Co. at Hartford, Conn., continues. The strikers report that about thirty men are now engaged in building tires, and of these thirteen are inspectors. The strikers still maintain pickets about the factory and are orderly. They are under the watchful eye of the police, who are cognizant of all that transpires in the neighborhood. It is claimed that the strikers in prevailing upon a man not to go to work at the plant in view of the strike find employment elsewhere for him and thus keep up their end of the situation. The officers of the company are still non-committal.

Another Racine Fire—The plant of the King Automobile Tire Co. at Racine, Wis., was damaged $3,000 by fire on January 1. The production will be carried on as usual, new equipment having been installed at once.

Warner Enlarges—The Warner Pole and Top Co., of Cincinnati, O., has enlarged its plant about 300 per cent. It reports an enormous increase in its business for 1910, and has prepared to take care of it, having installed new machinery. The company will manufacture 10,000 tops for the 1910 season.

Corliss Moving—The Corliss Motor Co. of Corliss, Wis., is moving the machinery and equipment of the Owen Thomas Motor Car Co., of Janesville, Wis., to Corliss, where it is being installed in the plant of the Wisconsin Engine Co. This plant will be used until the new works can be erected. The Wisconsin Engine Co. has already started to build the motors for the new car and the first of the 1910 production will be rushed. Much new machinery has been brought from the east, obviating the necessity of going outside for any parts to enter into the new car.

New Speedometer Branch—The Stewart & Clark Mfg. Co., of Chicago, western branch, with headquarters in San Francisco, will cover California, Oregon, Washington, Arizona, Montana and probably other western territory. Besides the main office in San Francisco, a subordinate branch has already been opened in Los Angeles, in southern California, and it is probable offices will be maintained in one of the big cities of the northwest. The new branch will be in charge of Hazlitt L. Pelton. The offices of the Stewart branch here will be at 307 Golden Gate avenue.

Alco Expands—The American Locomotive Co. is beginning to greatly enlarge its motor car manufacturing department. It was decided recently to expend a half million dollars in this expansion, and to purchase at once $150,000 worth of new tools and machinery and to break ground as soon as practicable for the erection of new buildings adjoining the present one on the factory grounds at Providence, R. I. It is expected that these new structures will be completed by next midsummer and that the output of Alco motor cars will be more than doubled by 1911. The Alco factory at Providence has been becoming more crowded and more busy for some time past. No locomotives are made at Providence now and some of the old buildings have been taken over by the motor car department, but even with these the room is proving insufficient.

Rambler Show in New York—Following a custom established 2 years ago, the Rambler is exclusively shown during the New York shows at the Rambler building, Broadway and Sixty-second street, New York. The Rambler Automobile Co. of New York has arranged for the reception of dealers, owners and friends in a way which would be quite impossible at the palace or garden shows.

Baker Will Build—The Baker Motor Vehicle Co. is operating its own retail sales agency in Cleveland and is erecting a handsome garage and salesroom at Euclid avenue and East Seventy-first street. The new Baker garage will be fireproof, of brick and stone construction, 160 by 200 feet, and will be one of the largest and best equipped garages in the country devoted to the care of electric motor cars.

Brings Out New Device—George Westinghouse, the Pittsburg inventor and head of the immense Westinghouse interests, is backing financially a new concern with a capital of $10,000, which is arranging to manufacture a shock absorber and will probably locate in some eastern town. The contrivance consists of cylindrical brass cups with a compressed chamber. The cylinders are each in two parts, one over the other. The plunger works up and down in the cylinder.

Change for Wilcox—George D. Wilcox, formerly manager of the Empire Sales Co., agents for the Regal in Syracuse, N. Y., has just been appointed district manager for the eastern district for the Regal company. Mr. Wilcox attained fame last summer through his transcontinental trip from New York to San Francisco in the Regal Plugger. He will make his headquarters in Syracuse, temporarily at least. The Regal agency has been taken over by the Central Auto Sales Co., with C. H. Otis as manager.

May Stay in Racine—It is now believed certain that the Racine Mfg. Co., of Racine, Wis., will not move to another city, despite flattering inducements. Before such intimations were made, however, Racine manufacturers and merchants offered to subscribe a fund of $100,000 to assist the company in rebuilding the plant destroyed by fire on December 12. Others announced their intention of building a body-manufacturing plant of their own. At this time the only building saved from destruction is being equipped with new machinery and new men are added daily to man the various shops used by the company in the production of bodies.

From the Four Winds

Fears Legislative Delay—Governor J. O. Davidson, of Wisconsin, has as yet given no intimation whether or not he will call a special session of the legislature. The good roads commission, one of four commissions appointed by the last legislature to consider important subjects, is ready to report, but the other three have not completed their labors. Advocates of good roads fear that the topic will be left for the 1911 legislature to decide, but it is certain that there will be a special session before the next regular one.

Governor Greets Miller—A welcome to the state of Massachusetts and the city of Boston was extended by Governor Eben S. Draper and Mayor George A. Hibbard to Miller and Henderson, the crew that brought the Thomas car, winner of the New York to Paris race, to Boston Christmas eve, to the accompaniment of screeching horns and with an escort of forty cars of all descriptions. After leaving the city hall the parade passed the state house, where a stop of 20 minutes was made while Governor Draper greeted Miller. After leaving the state house the parade continued to the new Thomas quarters, Copley square.

Syracuse Club Growing—At a meeting of the board of directors of the Automobile Club of Syracuse, of Syracuse, N. Y., twenty-six new applications for membership were received and acted upon favorably. This brings the membership of the club up to nearly 400, being an increase of 150 members since the first of July. It is the aim of the officers to make the list reach the 500-mark before the next annual banquet, which probably will be in March. The club has installed an elaborate system of filing manufacturers' catalogs, which can be found in the club's cabinet, where it is open for ready reference to the members, an idea that might be adopted elsewhere.

Glen Echo Again—John A. Garrett, former mayor of Glen Echo, Montgomery county, Maryland, announces his intention of carrying on a war against motor cars in the coming legislature, to which he has been elected a member. Garrett gained notoriety by imposing heavy fines on motorists of high and low degrees, especially Washingtonians, for speeding on the conduit road. "One of my objects in going to the legislature was to correct the motor car evils," he says. "I hope to have the legislature enact a law on motor cars empowering the commissioners of Montgomery county to impose a tax on all motor cars operating in that county. Motor cars do more harm to the roads of the county than all other kinds of vehicles combined, and largely because they thunder along at reckless and dangerous rates of speed." It might be said that as far as a special law for regulating the speed in Montgomery county alone is concerned, that there is not much likelihood of Mr. Garrett's wish being gratified.

Chauffeurs Form a Union—Considerable interest attaches to the fact that the chauffeurs of Washington, D. C., have organized the Chauffeurs' Protective Union, No. 236, and have affiliated with the American Federation of Labor under a charter of the International Brotherhood of Teamsters. Two hundred men were enrolled as charter members, while at the next meeting the applications of about fifty other drivers will be acted upon. The membership consists of taxicab drivers, operators of sight-seeing motor cars and the drivers of private owners and business houses.

Session for Salt Lake—The states of Colorado, Wyoming, Idaho and Utah will join hands in the promotion and establishment of good roads, inter-state highways being suggested as the possible outcome of the movement to be launched at a meeting to be held at Salt Lake City January 26 to 28. The convention, which is to be held under a call issued by Governor William Spry, of Utah, through discussion and the interchange of ideas, is expected to result in the adoption of a system of road construction particularly adapted to the topographical, climatic and commercial requirements of the intermountain country.

Denver Club Moves—After a year with its headquarters in the building of the Republican Club, the Denver Motor Club moved last week to new quarters at the Albany hotel. The new location is in the center of the business district, which will give the club members a better opportunity to get together at noon time. A suite of two rooms has been secured on the second floor and the club will also have the use of the large convention hall in which to hold monthly meetings. The club now has a membership of nearly 600, and a country club house will be one of the subjects to be taken up in the spring for discussion.

Mason Wins Tour—A Mason touring car, driven by B. Gardner, was awarded the trophy offered by a Dallas paper to the winner of the north Texas endurance and good roads tour. The Mason, with a total penalization of 64.2 points, made the highest score. The Overland runabout, S. C. Turkenhopf driver, won the second place with a penalization of 270.7 points. Third place was secured by the Marmon, with a penalization of 480.2, with C. Goldthwaite at the wheel. Only three out of eight cars finished the run, owing to the severe weather and rough roads. Notwithstanding all the adverse conditions surrounding the tour, the primary object was carried out to the fullest extent, namely, to start a good roads movement, and all persons directly or indirectly connected with the run agree that this purpose has been attained.

Hay Market Affected—That the rapidly increasing use of the motor car is seriously affecting the San Francisco hay market is the interesting statement made by a commercial paper of that city. In discussing the smallness of the demand for hay in San Francisco, the paper says: "The belief is entertained that the great number of motor cars is commencing to show effect upon the consumption of hay in the metropolis. This is strongly the case with the livery stables and carriage companies, which are reducing their stock, thereby reducing their consumption of hay. One of the largest carriage companies sold out at auction last week, not being able longer to make the business pay."

Good Roads Dinner—Alive to the importance of good roads, good streets and the urgent need for immediate action, Milwaukee city officials arranged a good roads dinner at the Deutscher Club, Milwaukee, Wis., last week, the guests of honor being Professor J. Minnwegen, of Washington, a government expert who was sent to Europe to study road-building during the Roosevelt administration; Professor J. J. Sloan, of Chicago, and Professor W. G. Hotchkiss, director of the Wisconsin geological survey and the best known roads expert in the northwest. The guests included all members of the park commission, members of the common council, heads of municipal departments, officials and representatives of paving material concerns.

Helps Santa Claus—As usual, motor cars played an important part in the Christmas charities of Indianapolis. A number of players appearing at the Colonial theater gave short entertainments in down town hotels, cafes and clubs for the benefit of the Star Santa Claus fund, conducted by the Indianapolis Star, and collected $500 for the charity. They rode for several days in a car furnished by the Premier Motor Mfg. Co. A dozen motor trucks were donated by various concerns for delivering the packages of toys and gifts distributed through the fund to the unfortunate children of the city. The Indianapolis News, following its usual custom, distributed several hundred baskets of food to unfortunate aged, the distribution being made in eight cars donated by the Premier Motor Mfg. Co.

Brief Business Announcements

New York—Harrison H. Boyce, of 1989 Broadway, has been appointed metropolitan agent for the Petrel.

Boston, Mass.—George W. McNear has taken over the business of Quinsler & Co., and is making a specialty of order work on enclosed bodies.

Austin, Tex.—The Neches Motor Car Co., of Beaumont, has been incorporated with a capital stock of $10,000, by W. C. Gray, W. Leight and G. H. Leight.

Pittsburg, Pa.—Joseph Feicht, who has the agency in this city for the Regal, has taken over the Central Automobile Co., of 5989 Center avenue, and in the future will make his headquarters there.

Detroit, Mich.—The Detroit Body Co. has filed articles of incorporation at Lansing, with a capital stock of $20,000, and will manufacture vehicle bodies. The incorporators are F. M. Sibley, H. H. Berger and F. M. Sibley, Jr.

Mt. Clemens, Mich.—Four factory sites have been offered to the Wolverine Motor Car Co., which has been considering the advisability of changing its location, and has been in correspondence with the chamber of commerce regarding a location in this city.

Chicago—The White Star Taxicab and Garage Co. has been incorporated with a capital stock of $50,000, and will operate cars for hire, and also will conduct a garage. The incorporators are H. J. Guttman, W. J. S. Hyde and E. D. Fitch, all of whom are residents of Chicago.

Houston, Tex.—Work has been commenced on the new garage which is to be built for the Auto and Motor Boat Co., and the concern hopes to be installed in their new home in a very short time. The Houston Motor Car Co. is about to erect a new garage at Caroline street and Preston avenue.

Vincennes, Ind.—The Webb Motor Fire Apparatus Co., which has been located here since its organization 3 years ago, has decided to remove to St. Louis, Mo., and will be settled in its new plant by the first of the year. A. C. Webb, of this city, is to continue with the company, while the others interested are mostly residents of St. Louis, including D. B. Blossom, F. R. Tate, H. W. Fremmer and others.

Toledo, Ohio—The Consolidated Mfg. Co., of this city, at one time maker of the Yale car, and which has been operating under a receiver for about 3 years, is to be reorganized, and will start in an independent business very shortly. The new company has been incorporated under the laws of this state with a capital stock of $225,000, and will manufacture motors, bicycles, motor cycles, package carriers and drop forgings. The property will be taken over by the new concern within a month.

Brooklyn, N. Y.—In the future the Franklin will be handled in this borough by the Curtiss Automobile Co.

Atlanta, Ga.—The McNabb Iron Works has been organized recently, and will engage in the manufacture of small motor cars. The new company has a capital stock of $100,000.

Pittsburg, Pa.—Application will shortly be made for a charter for the Pittsburg Motor Car Co. The new concern is to manufacture and deal in motor vehicles and their parts and appliances.

New Orleans, La.—The White Co. is preparing to open a new garage and salesroom in this city before the end of the year. The garage is to be located in the downtown district and will be run in connection with the showroom.

Albany, N. Y.—The Cutting Motor Co., of New York, has been incorporated with a capital stock of $100,000, to engage in the manufacture of cars, and act as a sales agency. The incorporators are H. Rosenburg, H. P. Jones and H. M. Browne.

New Orleans, La.—A number of new garages are being built in this city. A. Aschaffenburg is shortly to erect a garage and salesroom on St. Charles street, and L. H. Fairchild is planning the erection of a similar structure on the same street. Emilien Perrin has arranged a deal for the erection of a garage at Dryades and Lafayette streets to be two stories in height, and will cost about $25,000. The building has been leased to the Crescent Automobile Co. for a term of years.

Northampton, Mass.—A taxicab line has commenced business in this city under the name of the Warren Auto Co.

Boston, Mass.—Charles S. Henshaw has leased the store at 587 Boyleston street, and in the future this is to be the local home of the Thomas company.

Lansing, Mich.—Notice has been given of the increase of the capital stock of the Muskegon Motor Specialties Co., of Muskegon, from $20,000 to $30,000.

New York—Articles of incorporation have been filed by the Rex Tire Co., which has a capital stock of $50,000, and is to engage in the manufacture of tires. The incorporators are M. Ely, C. Fuller and S. N. Richardson.

Johnstown, N. Y.—A new concern has been incorporated in Albany, under the name of the Johnstown Motor Car Co. It has a capital stock of $15,000, and is controlled by C. A. Miller, G. Hildebrandt, H. Veghte and others.

Albany, N. Y.—The Bonner Automobile Co., of Brooklyn, has been incorporated with a capital stock of $2,500, to manufacture horseless vehicles, motors, engines, etc. The incorporators are C. L. Bonner, J. G. Gastelger and J. W. Gastelger.

Camden, N. J.—The Werner Ignition Co. has been incorporated with a capital stock of $20,000, to buy, sell and install appliances, parts, supplies and devices for explosive engines. The incorporators are P. R. Werner, R. Burns and Edward Board.

Philadelphia, Pa.—Application is shortly to be made for a charter for a new corporation to be known as the Bergdoll-Hall Motor Car Co., which is to deal in, rent and repair motor-driven vehicles of all kinds, together with their various parts, appliances and supplies.

Dover, Del.—Articles of incorporation have been filed by the Johnson Motor Car Co., which has a capital stock of $100,000. The incorporators are J. H. Johnson, Claude Johnson and J. Howard Johnson. Another new concern which has been recently incorporated is the Maitland Tire and Tube Co., which has a capital stock of $500,000.

Lansing, Mich.—The Russell Motor Axle Co., of Detroit, has been incorporated with a capital stock of $1,000,000, by A. W. Russell and B. H. Lawson. Another new company which has filed articles of incorporation is the Van Dyke Motor Car Co., also of Detroit, which has a capital of $1,000,000. The incorporators are F. G. Van Dyke and G. P. Davis.

RECENT INCORPORATIONS

Spartanburg, S. C.—Southern Auto Co.; capital stock, $10,000; to do a general motor car business. Incorporators, A. B. Calvert, W. Thompson and A. L. Crutchfield.

Wilmington, Del.—Johnston Motor Car Co.; capital stock, $100,000. Incorporators, J. J., C. R. and J. H. Johnston, all of Philadelphia, Pa.

Dover, Del.—Maitland Tire and Tube Co.; capital stock, $550,000. Incorporators, F. M. Shive, S. E. Robertson and M. W. Davis.

Belfast, Me.—McNable Iron Works; capital stock, $100,000; to engage in the manufacture of motor cars. A. W. Keating is the president of the company, and M. W. Lord is to be the treasurer.

Brooklyn, N. Y.—Rockwell Motor Transportation Co.; capital stock, $5,000. Directors, George Rockwell, of Waterbury, Conn., and George Rockwell, Jr., and Edward S. Smith, both of Brooklyn, N. Y.

Brooklyn, N. Y.—Enterprise Garage Co.; capital stock, $25,000. Incorporators, G. A. Sands, Neil Campbell and J. R. Rubin.

New York—Bauer Non-Collapsible Wheel Co.; capital stock, $150,000; to manufacture vehicle wheels, motors, engines, cars, etc. Incorporators, W. J. Bauer, M. Haupt and F. Bohen.

Chicago—Gardner Engine Starter Co.; capital stock, $1,000; to engage in the manufacture of trusses and strengthening devices for use of motor cars. Incorporators, G. A. Chritten, R. Wiles and D. B. Gardner.